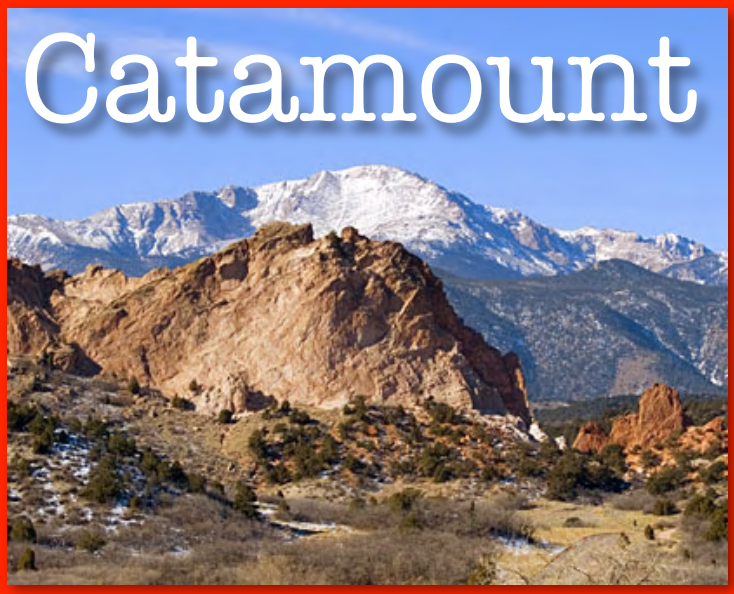

Catamount Forest Health & Hazardous Fuels Reduction Project

Environmental Assessment

USDA Forest Service
Pike National Forest
Pikes Peak Ranger District

October 2010

Commonly Used Acronyms and Abbreviations

BMP	Best Management Practices
CDOW	Colorado Division of Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWPP	Community Wildfire Protection Plan
DAU	Data Analysis Unit
DBH	Diameter at Breast Height
ESA	Endangered Species Act
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Geographic Information System
HFRA	Healthy Forests Restoration Act
HUC	Hydrologic Unit Code
ID Team	Interdisciplinary Team
MA	Management Area
MIS	Management Indicator Species
MSO	Mexican Spotted Owl
NDIS	Natural Diversity Information Source
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NFSR	National Forest System Road
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
OHV	Off-Highway Vehicle
PAC	Protected Activity Center
PSICC	Pike and San Isabel National Forests, and Cimarron and Comanche National Grasslands
R2	Region 2 (Rocky Mountain Region)
ROS	Recreation Opportunity Spectrum
SHPO	State Historic Preservation Office
SS	Sensitive Species
T&E	Threatened and Endangered
TCP	Traditional Cultural Property
USDA	United States Dept. of Agriculture
USDI	United States Dept. of the Interior
USFWS	United States Fish and Wildlife Service
WCP	Watershed Conservation Practice
WIZ	Water Influence Zone
WUI	Wildland-Urban Interface

Table of Contents

Table of Contents (continued)

Table of Contents (continued)

Table of Contents (continued)

List of Tables

Table of Contents (continued)

List of Figures

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Chapter 1. Purpose of and Need for Action

The Pikes Peak Ranger District of the Pike and San Isabel National Forest has prepared this Environmental Assessment (EA) on the potential environmental effects of proposed activities in the Catamount Forest Health and Hazardous Fuels Reduction Project area, in compliance with the National Environmental Policy Act (NEPA) and the Healthy Forests Restoration Act (HFRA) and other relevant federal and state laws and regulations.

1.1 Purpose and Need for Action

The Catamount Forest Health and Hazardous Fuels Reduction Project would create more sustainable forest conditions that are more resilient to fire, and insects and diseases while providing for diverse wildlife habitat, recreational opportunities, sustainable watershed conditions and increased public safety. The objectives of the project are to modify vegetation within the project area in order to reduce fuels for wildfires. The purposes of this project are:

1. To reduce the risk that a wildfire would negatively affect the municipal watershed reserves for the cities of Colorado Springs, Green Mountain Falls, Cascade, Chipita Park and Manitou Springs.
2. To reduce fuels and associated risk of extreme fire behavior in the Wildland Urban Interface.
3. To improve forest health, vigor, and resistance to fire, insects and disease.
4. To reduce the risk of severe flooding and sedimentation for the protection of public safety, water system infrastructure, and other natural and developed resources.

This project is needed because of the high potential for catastrophic wildfires to occur in the area. There are hundreds of homes, critical watersheds and significant associated infrastructure at risk in, adjacent to and near the project area. The steadily increasing population and associated development in the area will proportionately increase this risk in the future. Tree thinning, prescribed burning, and/or other fuel reduction methods can significantly reduce the hazard of intense fires.

Further, the need for the proposed project is driven by the deteriorating forest conditions. Historic fire suppression has created forests that are more susceptible to a large-scale, high intensity wildfire, as well as insect epidemics. The need to reduce forest fuels has been clearly demonstrated by the recent large-scale, high intensity fires occurring across the western United States and on the Front Range of Colorado.

The Pikes Peak region, not unlike many other Front Range areas, is challenged with a mosaic of forest conditions outside of their historic range of variability causing concern for the increased potential of catastrophic wildfires in the area. The compounding effects of historical logging intensity, large stand

replacing fires during the late 19th and early 20th centuries, and aggressive fire suppression efforts has resulted in unnatural forest conditions. The juxtaposition of the current forest conditions on Pikes Peak with local water, recreation, and other natural and developed resources are of great concern as wildfires have increased by number of incidents, intensity, and acres burned across the state of Colorado.

The watersheds in the project area are critical community resources as they are the source of their domestic water supply. For example, Colorado Springs Utilities' local raw water system operation relies predominantly on Pikes Peak as a source water supply from the native yields, storage, and receiving point for the Blue River System water. This water supply is critical to specific water treatment plants, from both a quantity and quality perspective, as well as for compliance with the Safe Drinking Water Act and meeting consumer demands.

The Hayman Fire, as well as several other recent fires on the Pike and San Isabel National Forests have destroyed homes, infrastructure and other property on private and public lands; seriously damaged critical watersheds; imperiled fish and wildlife habitat; and reduced recreational opportunities. Subsequent run-off from severe thunderstorms during the monsoon season over the fire-denuded areas have eroded soils, causing flooding, destroyed homes, damaged highways and various other facilities as well as degraded fisheries.

1.2 Proposed Action

The Pikes Peak Ranger District of the Pike and San Isabel National Forest proposes to treat approximately 21,100 acres within the 100,000 acre Catamount Project Area to move the montane forest ecosystem towards its historic conditions. The treatments would result in reducing wildfire hazards and improving the health of the forest. The 21,100 acres of treatment contain Ponderosa pine, Limber pine, Douglas-fir, Aspen and Oak shrublands (Figure 1). Specific actions would be dependent on site-specific conditions and the vegetation type, however, actions would include thinning, created openings and prescribed burning. A combination of mechanical harvesting equipment and hand treatment would be used. No new systems roads would be constructed, however some temporary roads would be used.

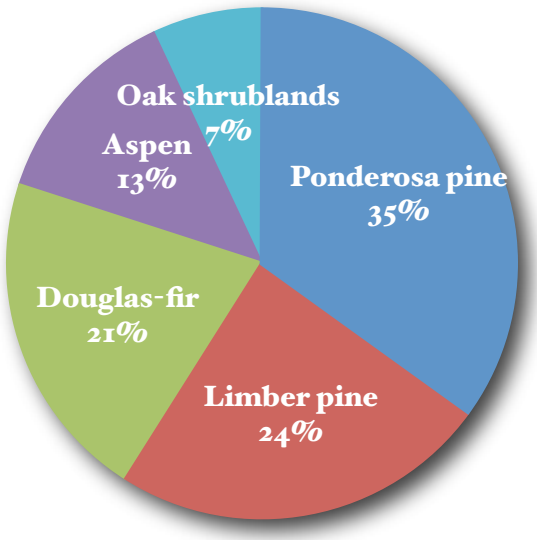

Figure 1. Estimated Distribution of Vegetation Types in Catamount Proposed Action

The Catamount Project Area encompasses approximately 98,757 acres of which 69,804 acres are National Forest System lands and 28,953 acres are in other ownership, primarily private land holdings (Figure 2). The entire Catamount Project Area is within the Pikes Peak Ranger District of the Pike and San Isabel National Forest. The Catamount Project Area is located in El Paso and Teller Counties approximately 20 miles west of Colorado Springs.

The most prominent feature in the Catamount Project Area is Pikes Peak which is in the central portion of the Catamount Project Area. The Catamount Project Area includes the north and south slope of Pikes Peak and is bounded on the northeast by Rampart Range, on the east by the City of Colorado Springs, on the south by Gold Camp Road on the west by State Highway 67 and Mueller State Park and on the northwest by Catamount Reservoir.

1.3 Municipal Watershed Reserves

A series of Congressional legislation and cooperative agreements have designated 29,473 acres as municipal watersheds for Colorado Springs, Manitou Springs and Cascade Town Company. These lands more or less coincide with the 10E management area in the 1984 Forest Plan.

1.3.1 Congressional Act of February 27, 1913

The 1913 Act designates 14,843 acres within the Pike and San Isabel National Forest to be "*reserved from all forms of location or entry and set aside as a municipal water supply reserve for the benefit of the City of Colorado Springs ...*" (10,131 acres) and "*the town of Manitou ...*" (4,712 acres). These lands "*shall be administered by the Secretary of Agriculture at the expense of and in cooperation with the city of Colorado Springs and town of Manitou, said expense to be borne and paid*" proportionately by the municipalities "*for the purpose of storing and conserving the water supply, protecting them from pollution, and preserving the timber on said lands to more fully accomplish such purposes ...*". Further, the right to construct water improvements is granted, subject to approval by the Secretary. The Secretary is authorized to prescribe and enforce regulations necessary to carry out the purposes of the Act, including the right to prohibit access of persons other than forest officers and municipal authorities.

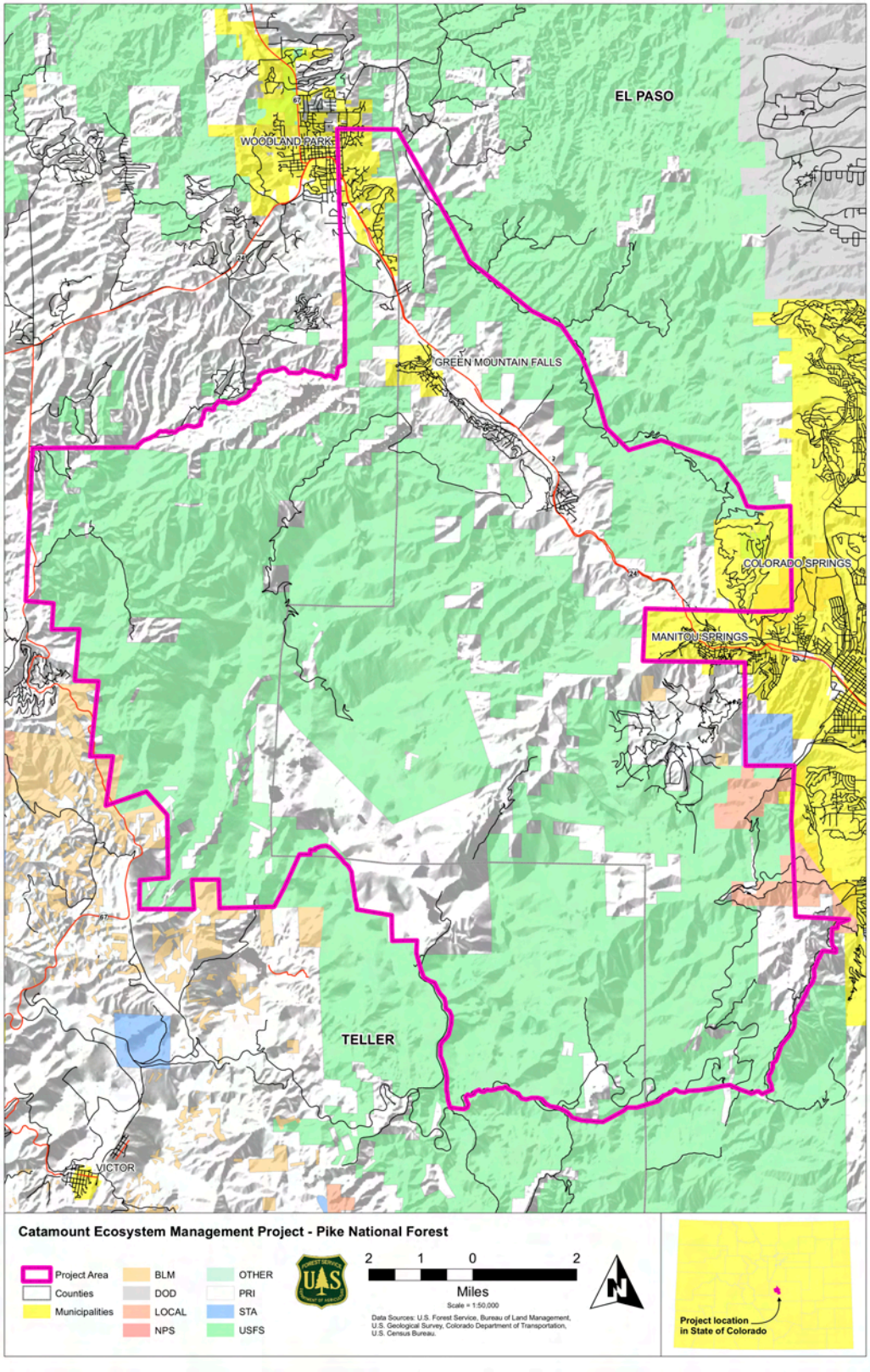

Figure 2. Catamount Project Area Location

1.3.2 Cooperative Agreement of October 9, 1914 with Colorado Springs and Manitou

In 1914, the USDA Forest Service entered into a cooperative agreement with the City of Colorado Springs and the town of Manitou "*for the purpose of clearly defining the acts which shall be performed by the parties to the agreement in order that the purposes of the said act* (e.g. Congressional Act of February 27, 1913) *shall be carried out.*"

- The Secretary of Agriculture agrees to "*extend and improve the Forest ... by seeding and planting and by putting into effect the most approved methods of forest management*".
- The Secretary will cause these lands to be protected from fire to the same extent as other National Forest Lands
- The municipalities may enclose all or part of the lands, subject to the building of gates at the direction of the USDA Forest Service
- The municipalities will cooperate with the USDA Forest Service for fire protection. They will pay for additional guards hired by the USDA Forest Service
- The municipalities "*will take whatever steps are necessary to enforce any sanitary regulations which are now or may be adopted by it respecting said reserve, without calling on the Secretary of Agriculture for assistance.*"

1.3.3 Special Regulations of 1914

In 1914, the Secretary of Agriculture issued a set of special regulations for the municipal watershed lands under the authority of the Congressional Act of February 27, 1913. These regulations state:

- "*Driving stock or permitting them to stray upon the municipal water supply reserves ... is strictly forbidden.*"; and
- "*No person other than Forest officers or officers and employees of Colorado Springs and Manitou shall occupy public lands within said reserves for any purpose without first obtaining a permit signed by the Forest Supervisor and approved by the proper municipal health officer.*"

1.3.4 Cooperative Agreements of 1923 and 1924 with Colorado Springs, Manitou and Cascade Town Company

This agreement designates 10,194 acres for the City of Colorado Springs and 955 acres for Manitou and 3,481 acres for the Cascade Town Company to be managed for the purpose of conserving and protecting the water supplies of the municipalities. These lands are in addition to and separate from the lands designated in the Act of 1913. Key provisions of these agreements are:

- Use of the lands will not be permitted without approval of municipal authorities except for forest management activities including the marking and cutting of timber and construction of transportation and communication structures that are not inconsistent with the object of the agreement.
- Anyone occupying these lands must comply with National Forest regulations and sanitary regulations proposed by the municipalities and approved by the Secretary.
- The Secretary will extend and improve the forests on these lands by seeding and planting and by the most approved methods of silviculture and forest management.
- The municipalities will cooperate with the USDA Forest Service in patrolling these lands for enforcing regulations and suppression of forest fires. Any additional guards will work for the USDA Forest Service, but their compensation will be paid by the municipalities.

1.4 Decision Framework

The District Ranger, who is the Responsible Official, will decide which actions, if any, to implement. This decision will be based on:

- Whether the proposed activities and alternative address the issues, are responsive to national policy/ guidance and direction in the Forest Plan, as amended, and meet the purpose of and need for action in the Catamount Project Area.
- Whether the information in this analysis is sufficient to implement proposed activities.
- Whether the proposed activities would have significant effects and therefore required the preparation of an Environmental Impact Statement.

If an action alternative is selected, project implementation could begin in the first quarter of 2011. Most actions would be accomplished within a decade. Certain actions could last longer.

1.5 Public Involvement

The NEPA process and the associated USDA Forest Service implementing regulations provide for an open public involvement process. The NEPA phase of a proposal begins with public and agency scoping. Scoping is the process used to identify major issues and to determine the extent of environmental analysis necessary for an informed decision to be made concerning a proposed action. Issues are identified, alternatives are developed, and the environmental analysis is conducted and documented. The Catamount Forest Health and Hazardous Fuels Reduction Project is being prepared as an authorized hazardous fuels reduction project utilizing the appropriate tools under Title I of the Healthy Forest Restoration Act (HFRA) of 2003. The purpose of this Act is to expedite hazardous fuels reduction and forest restoration projects on federal lands at risk of wildland fire or insect and disease epidemics.

Three public meetings were held to gather public comments. Scoping for the Catamount Project began on April 23, 2009 when a scoping meeting was held at the Colorado Springs Utilities facility in Colorado Springs. Maps of the project area and information on the approach of the project were presented in an open house format. Thirty-three people signed in at that meeting and three written comments were received. Following the review of those comments and the public's generally positive reactions at the first meeting, priority treatments areas were drawn on a map and presented to the public on November 5, 2009 at the same location as the first meeting in Colorado Springs. Three people from the public attended that meeting along with several agency people. The priority treatment areas were then examined in more detail by the Interdisciplinary Team and a revised proposed action was presented to the public on November 18, 2009 in Woodland Park. Only one person from the public attended that meeting. Three additional written comments were received as a result of the last two meetings.

Public outreach, meeting notices and advertisement included:

1. The posting of legal notices in local newspapers
2. Mailing letters to 260 people, groups and agencies
3. An article in the Colorado Springs Gazette
4. A news release that was sent to the local media and congressional staff
5. Posting a notice on the USDA Forest Service website

The scoping comment period ended on December 4, 2009. A scoping report was created that presents the results of a content analysis completed on the comments. Content analysis is a process that identifies specific, separate statements within each submitted letter and categorizes them. These comment categories were then used to help frame the public issues for consideration and further refine the proposed action and consider alternatives to the Proposed Action.

The formal scoping process generated 6 letters from groups (2 letters), agencies (3 letters) and individuals (1 letter). The letters are in the administrative record for this project.

1.6 Issues

Issues are points of discussion, debate, or dispute about environmental effects that may occur as a result of the proposed action or an alternative. It is these potential environmental effects, particularly potential negative effects, which provide focus for analysis, influence alternative development, and lead to development of mitigation measures. Issues are used to display differing effects between the proposed action and the alternatives regarding specific resource elements.

A list of potential issues was developed by the project interdisciplinary (ID) team on the basis of their knowledge of the Proposed Action and the area affected, and the public comments submitted during scoping. These "potential issues" are reviewed to determine: a) the significant issues to be analyzed in depth, and b) issues which are not significant or which have been covered by prior environmental review and, therefore should be eliminated from detailed analysis. Three significant issues were identified.

1.6.1 Watershed Protection

Watershed protection is an important aspect of this project. It has been documented that fuels reduction projects can reduce fire severity (Graham et al. 1999, Oucalt and Wade 1999, and Pollet and Omi 2002) and therefore reduce the potential impacts of a fire on increased erosion, sediment yield, flooding and debris flows. Those effects would be beneficial to the municipal watersheds and watersheds that contain greenback cutthroat trout and/or their habitat. The issue is that the proposed vegetation treatments would generate increased sediment and other water quality problems through soil disturbance and compaction, and increased water yield. Water quality impacts from fine sediments are also a concern because of the importance of these watersheds as a drinking water source.

1.6.2 Forest Restoration

The ponderosa pine forest is denser throughout much of the Catamount Project Area than historical conditions (Foster Wheeler Environmental Corporation 1999 and USDA Forest Service 2008). Other vegetation types have also not seen natural disturbances in many decades due to fire suppression. The issue of forest restoration is a concern that the treatments will not result in the forest structure that would approximate historical conditions. One specific concern is that too many large trees will be removed to make the treatments more economically viable.

1.6.3 Wildlife

The forest treatments that are proposed for the Catamount Project Area would change wildlife habitat conditions. These changes could potentially adversely impact wildlife populations. There are some concerns that the treatments would reduce habitat for wildlife that depends on denser forest conditions. There is also a concern that the equipment used for the treatments would cause impact to habitats. There are also some concerns about potential sediment and water quality impacts to greenback cutthroat trout.

Chapter 2. Alternatives

This chapter describes and compares the No Action and the HFRA Proposed Action to be considered in this analysis. It includes a description of each alternative considered. This section also presents a summary comparison of the effects of the alternatives based on the issues, defining the differences between each alternative and providing a basis for choice among options by the decision maker and the public. The HFRA Proposed Action was developed to respond to the purpose and need, and is fully compliant with the Forest Plan.

2.1 Alternative A - No Action

Under Alternative A (No Action), none of the proposed thinning, creating openings, prescribed burning, and removing trees and fuels breaks would be implemented in the Catamount Project Area. Vegetation on the forest would follow natural succession, disturbance and recovery processes. These processes include the continued natural accumulation of forest fuels over time. The municipal watershed reserves for the cities of Colorado Springs, Green Mountain Falls, Cascade, Chipita Park and Manitou Springs would remain susceptible to catastrophic wildfires that could negatively affect the ability of those watersheds to provide high-quality drinking water. The WUI would continue to have a high risk of extreme fire behavior in many locations. Forest health and vigor, and associated resistance to insects and disease would continue to decline.

2.2 Alternative B - Proposed Action

The Proposed Action would focus on restoring the montane forest to its historic conditions, that would result in reducing wildfire hazards and improving the health of the ponderosa pine and Douglas-fir dominated forests of the montane ecosystem. The Proposed Action consists of vegetation treatments including thinning, creating openings, prescribed burning, and removing trees on up to 21,100 acres within the Catamount Project Area (Figure 3). It is expected that the proposed treatments would take five to ten years to complete to accomplish the initial project objectives.

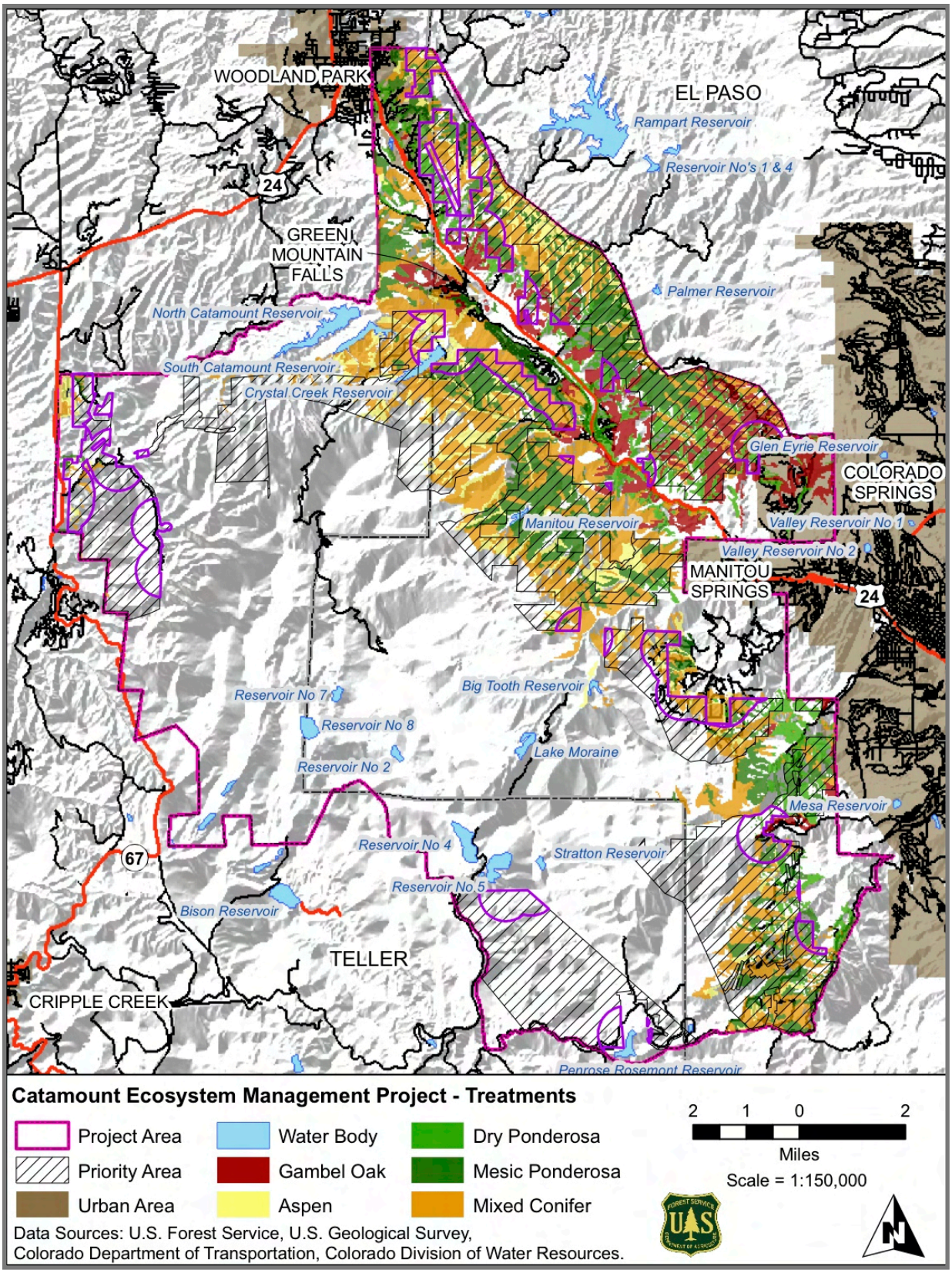

Figure 3. Catamount Priority Treatment Areas

2.2.1 General Operations

The following items are general operating guidelines that would be used.

- Adaptive management would be used to ensure protection of resources and restoration of the ecosystem. Operations and treatment areas would be monitored during the life of the project to ensure management and resource protection objectives are achieved. When the monitoring demonstrates that the objectives are not being met, changes in the treatment approach would be implemented to achieve the desired results.
- Operations would comply with the standards and guidelines listed in the Land and Resource Management Plan, Pike and San Isabel National Forests; Comanche and Cimarron National Grasslands (Forest Plan) as amended.
- Harvesting equipment would not be allowed on slopes greater than 35 percent to remove logs, unless the contractor can demonstrate ability to remove logs without environmental damage, such as excessive soil disturbance.
- Conventional logging systems would be used to remove logs from areas that are accessible from existing National Forest System Roads, unclassified roads, or constructed temporary roads. Typically, skidders would be used to yard trees off the site.

2.2.2 Forest Treatments by Vegetation Type

Kaufmann and others (2006) identify five major vegetation zones of the Colorado Front Range. These zones are roughly determined by elevation and range from the low elevation Plains Grassland up to the high elevation Alpine. The proposed vegetation treatments for the Catamount project are primarily within the Lower and Upper Montane vegetation zones. Ponderosa pine is a dominant tree species of the Lower Montane zone although Douglas-fir is also present in many locations. The upper Montane Zone is a transition from the Montane to the Subalpine fir zone and vegetation patterns are more complex. Ponderosa pine is still a part of this zone however other tree species are also common including Douglas-fir, lodgepole pine, limber pine, aspen and white fir. Within each of the major vegetation zones topographic position, aspect and soils also influence the mix of vegetation and the response to disturbance.

A review of the data on historic fire regimes of the area (Kaufmann et al. 2006) indicate that at any given elevation, xeric (dry) sites were more likely to support low density stands and lower severity fires than were mesic (moist) sites. Because of this variability no vegetation zone had a uniform historical landscape structure or type of fire behavior. Instead there was a mix of fire regimes within each vegetation zone. However, the proportion of the landscape that supported low density stands and low severity fires most likely decreased with elevation as the amount of more mesic conditions increases. Under the more mesic conditions a mixed severity fire regime would have resulted in a greater variety of stand structures. At the higher elevations and most mesic sites a low frequency, high severity fire regime would most likely have prevailed resulting in large blocks of dense homogenous stand conditions as is typical of the spruce-fir stands found in the Subalpine zone.

Based on these generalities, recommended stand treatments have been developed for the stands within the Catamount Project area. These recommended treatments are based on elevation, slope, aspect, topographic position as well as the current forest vegetation.

The priority treatment areas shown on Figure 3 cover about 33,600 acres. Within the priority treatments areas there are several specific vegetation types that are the target of the Catamount Forest Health and Hazardous Fuels Reduction Project. These vegetation types cover an estimated 21,100 acres (Table 1). No-treatment areas are included as part of the design of the Proposed Action. No-treatment areas include areas where fuels reduction or forest health treatments are not needed. Where stand variations dictate an alternative treatment to the majority treatment, this variation would be accommodated. For example; a quarter acre pocket of aspen within a conifer stand will be cleared of conifers within and up to one tree length (50 feet) from the edge of the aspen pocket to promote aspen sprouts.

Table 1. Catamount Priority Treatment Areas

Vegetation Type	Area (acres)	Percentage
Gambel Oak	1,500	7%
Aspen	2,200	11%
Dry Ponderosa pine	1,700	8%
Mesic Ponderosa pine	6,100	29%
Mixed Conifer	7,600	36%
Fuel Breaks	2,000	9%
Total	21,100	

Ponderosa Pine

Ponderosa pine in the Project Area can be divided into two classifications; dry and mesic (Kaufmann et al. 2006).

Dry Ponderosa Pine

Dry Ponderosa pine likely had frequent low intensity fires and open forest conditions historically. These areas would have had an extensive ground cover of various grasses and forbs with scattered shrubs. The objective of the prescribed treatments is to create and maintain the more open forest conditions that historically characterized these dry site forests. The residual stand basal area would range between 40-80 square feet per acre. The resulting forest would be more resilient to surface fires and have a lower risk of sustaining a crown fire.

Dry Ponderosa pine is classified as:

1. Ponderosa pine stands below an elevation of 6500 feet
2. Ponderosa and Douglas-fir stands between 6500 and 7500 feet in elevation except on north slopes
3. Ponderosa and Douglas-fir stands between 7500 and 8500 feet in elevation on south and west aspects, and exposed ridges

Mesic Ponderosa Pine

Mesic Ponderosa pine likely developed under a mixed severity fire regime (Crane 1982 and Kaufmann et al. 2006) that would have resulted in a greater variety of stand structures and ages along with more shrubs and small trees, and less continuous ground cover of grasses and forbs than would have developed on the drier Ponderosa pine sites. As with the drier Ponderosa pine, the objective would be to create more open forest conditions. However, there would a greater range of residual stand densities and fewer fire maintained openings in these more mesic areas. There would also be a greater amount of Douglas-fir left within the residual stands. Residual stand densities would range from 40 to 100 square feet per acre.

Mesic Ponderosa pine is classified as:

1. Ponderosa Pine stands between 6500 and 7500 feet in elevation on north aspects
2. Ponderosa Pine stands between 7500 and 8500 feet in elevation on north and east aspects
3. Ponderosa Pine stands between 8500 and 9500 feet in elevation on all aspects

Ponderosa Pine Guidance and Constraints

The following guidance and constraints will be used in treating Ponderosa pine:

1. In ponderosa pine stands, reduce canopy closure to an average about 20 to 25 percent. Overall, canopy cover may differ substantially from one point to another, but across a given area it would average 20 to 25 percent.
2. Preference would be given to retaining ponderosa pine over Douglas-fir and retaining larger trees with few low branches. Larger more mature trees would typically be retained. The spacing would be variable retaining natural clumpy characteristics. Existing snags that are not a hazard, would be retained for cavity-dependent wildlife.
3. Trees would be thinned in a manner to create clumps or cohorts of trees intermingled with small irregular openings or areas of lower tree density. Existing stand structure and site conditions would determine where "clumps" and small openings would be created. In general, pockets of older, platy-barked trees would be targeted as leave clumps, and areas of younger trees or pockets of dwarf-mistletoe-infected trees would be targeted for removal to create openings.
4. Slash left on-site would be lopped and scattered or crushed with yarding and harvesting equipment. Heavy slash would be piled for burning.
5. Opportunities for holiday tree cutting and firewood gathering by the public would be provided.

Openings would be created over 20 to 25 percent of the treatment areas to restore historic conditions using the following guidance and constraints:

1. Openings would be between 1 and 40-acres in size.
2. The lowest tree densities and majority of openings would occur on the dry Ponderosa pine sites. The more mesic Ponderosa pine sites would have fewer openings and slightly higher tree densities.
3. Approximately 40 percent of the acres in openings would have no trees and the remaining 60 percent would have canopy closures of 1-10 percent.
4. Slash left on-site would be lopped and scattered or crushed with yarding and harvesting equipment.

Prescribe burn treatments would reduce litter and duff layers, slash produced by treatments, surface fuels, regeneration, ladder fuels, and maintain open forest conditions. Prescribed fires would also be used to create small openings. These treatments would be implemented with the following guidance and constraints:

1. Prescribe burn slash after material has sufficiently dried after completing treatments, where appropriate.
2. Prescribe burn the new openings again five to six years later if necessary to minimize tree regeneration and stimulate growth of grasses and forbs, then every 10 to 30 years as needed to maintain the openings.
3. Before any prescribed burning would take place, appropriate burn and smoke management plans that address site-specific details would be completed and approved.
4. Prescribed fire could be used in most areas that have been treated mechanically or by hand, or it could be used as a treatment by itself. The exact treatments to be used and their locations would be determined after vegetation treatments are completed, and would depend on the level of natural and activity fuels in each stand.

Aspen

The objective of vegetation management in aspen would be to restore the health and vigor of the existing aspen stands and expand their current extent. Treatments would include the removal of competing conifer trees and some cutting of aspen to encourage new growth. In areas with sudden aspen decline (SAD), clear-cutting may be used to promote propagation of new suckers. By reducing competition and propagating younger trees, the health and vigor of the stands would be improved and the remaining and new aspen would have increased resistance to insects and disease. In mixed conifer areas where there is an aspen component, small clearcuts would be used to convert those areas to aspen, increasing the percentage of aspen in the Project Area.

Mixed Conifer

Mixed conifer is classified as;

1. Douglas-fir and Limber pine cover types between 6500 and 7500 feet in elevation on north aspects
2. Douglas-fir and Limber pine cover types between 7500 and 8500 feet in elevation on north and east aspects
3. Douglas-fir and Limber pine cover types between 8500 and 9500 feet in elevation on all aspects.

Mixed conifer areas are generally composed of Limber pine, Douglas-fir, White fir and some Ponderosa pine. The objective for these more mesic sites would be to increase the age and spatial diversity of stand structures across the landscape. These areas most likely developed under a mixed severity fire regime (Crane 1982) that would have resulted in a greater variety of stand structures and ages. The density of these stands has increased due to the lack of natural disturbances. In particular, understory trees, that provide ladder fuels, are present across a larger proportion of the mixed conifer forest than would have existed historically. Therefore, the mixed conifer forests within the Project Area are at a high risk of large crown fires. Some areas would be thinned from below leaving a more or less even-aged stand of the larger cohorts. The more mature trees would be retained within these thinned areas and the more flammable understory trees would be removed. Residual stand basal areas would range from 60 to 100 square feet per acre.

In other areas, patchy openings would be created to encourage regeneration and provide an increase in age class diversity. Areas with evidence of disease or insect infestation (i.e., dwarf mistletoe, white pine blister rust, spruce budworm or bark beetles) would be priority areas for creating these openings. Openings would range in size from a quarter acre up to 40 acres with most being 1 to 10 acres in size. Small clumps of trees may be left scattered across the larger (greater than 1 acre) openings to create structural diversity and provide seed for natural regeneration. The less shade tolerant species would generally be favored for these leave tree clumps.

Standing dead trees that are not a safety hazard would be retained for cavity-dependent wildlife. Following treatment, prescribed fires would be used to reintroduce fire to the landscape. The current vegetative conditions preclude the use of prescribed fires because of the density of the vegetation.

Gambel Oak

The Gambel oak communities in the project area have become more decadent over time due to the lack of fire as a disturbance agent. Gambel oak becomes denser as it ages and shades out grasses and other ground cover. As the crowns of the oak brush become larger, the risk of crown fires increases. Grazing has also reduced ground cover in this community.

The objectives of treatments in the Gambel oak are to create fuel breaks and improve the vigor and palatability of plants used as forage for wildlife species. Mastication and hand thinning would be used to thin or remove Gambel oak and stimulate grass and other ground cover. These treatment areas would function as fuel breaks. The proposed Gambel oak treatments would promote suckering. Therefore, the treatment area would need periodic maintenance to retain their effectiveness as fuel breaks.

2.2.3 Fuel Breaks

A fuel break is a gap in forest vegetation or other forest fuels. The main goal of a fuel break would be to break the continuity of forest fuels at strategic locations that would slow the progress of a wildfire or modify its behavior so that fire suppression efforts are more effective. The proposed action would create up to 2,000 acres of fuel breaks. The specific locations for the fuel breaks would be determined during project implementation.

Fuel breaks would be created and maintained at strategic locations throughout the project area. The fuel breaks would likely be located where natural features, such as ridgetops, or manmade features, such as roads, would increase their effectiveness. The activities required to construct a fuel break would vary depending on the existing conditions, but would likely include thinning and prescribed fire. These activities would create and maintain open conditions.

2.2.4 Bighorn Sheep Habitat Improvements

Vegetation treatments for bighorn sheep habitat improvements would be part of the proposed action where they can fit within the purpose and need for this project. The USDA Forest Service would work cooperatively with the Colorado Division of Wildlife in the Queens Canyon Quarry and Williams Canyon areas during

project planning for vegetation treatments in Gambel oak. Vegetation treatments in these areas may be able to achieve the goals of the Catamount Forest Health and Hazardous Fuels Reduction Project and provide habitat improvements for bighorn sheep.

2.3 Design Features

The following design features are part of the proposed action.

2.3.1 Road Access

Access to treatment areas would comply with the following guidance and constraints:

1. Existing National Forest System Roads (NFSRs) would provide the primary access to the project area. No new NFSRs would be constructed. NFSRs used for the project would be maintained or reconstructed as needed to accommodate safety or environmental considerations.
2. Avoid using NFSRs that are not up to standards or are in the WIZ
3. When possible, use ridgetop NFSRs and avoid duplicate road access.
4. Unclassified roads/trails considered suitable for operations would also be maintained or reconstructed for use during this project, but would be rehabilitated once operations were completed. These unclassified roads are not part of the USDA Forest Service system and are candidates for restoration based upon roads analysis.
5. Temporary roads would be constructed to the minimum standard needed for safe and efficient use by project equipment, which may include vegetation clearing and minor earth movement. These activities would be reviewed by a USDA Forest Service Engineer and Hydrologist.
6. Unclassified and temporary roads used to access the treatment areas would be restored by combination of water barring, scarifying, seeding, and blockading access after treatments are completed. These activities would be reviewed by the USDA Forest Service Engineer and Hydrologist.
7. Use of private roads in the project area could increase access for ground-based logging systems or reduce the need for some roadwork on National Forest System lands. During implementation, these options would be pursued to reduce the cost and impact of the project.

2.3.2 Soil and Water Quality Protection

1. Project activities would meet or exceed Colorado Forest Stewardship Guidelines, USFS Region 2 Watershed Conservation Practices Handbook Guidelines and PSICC Forest Plan Standards to protect water quality.
2. Detrimental soil compaction and displacement would be limited to 15 percent (or less) of each treatment area by implementing the following recommended methods:
    a. Require ground based skidding over frozen ground or dry soils (less than 20 percent soil moisture).
    b. Require at least partial suspension of logs for all yarding systems.
    c. Monitor unit for detrimental soil conditions following yarding; allow machine piling only if detrimental soil conditions would not exceed 15 percent standard.
    d. Limit ground based equipment to slopes less than 30 percent and less than 40 percent for less than 200 feet.

e. Avoid rutting and soil disturbance that could concentrate overland flow.

f. Do not designate a landing in the bottom of a drainage

g. Cross draws at a steep angle with equipment to minimize length of crossing.

3. Temporary road construction would be avoided on slopes steeper than 20 percent; and avoid stream crossings.

4. A maximum amount of woody debris along with some fine organic matter would be left to retain soil moisture (given that the amount is acceptable from a fuels standpoint); use low to moderate intensity burn to retain most of the three inch and greater material and some of the fine material.

5. Mechanical thinning treatments would not occur inside the Water Influence Zone (WIZ) as delineated by a Fisheries Biologist or Hydrologist. If the area has not been delineated, then treatments would occur outside a 100-foot buffer from all perennial and intermittent streams. The 100-foot WIZ also applies to all lakes, ponds, kettles and other forms of standing water. Some activities such as prescribed burning and hand treatments may be allowed in the WIZ, but only after consultation and concurrence with the project Hydrologist or Fishery Biologist.

6. Heavy equipment and vehicles would be kept out of the WIZ, streams, ephemeral draws, and lakes, except to cross at designated points, building crossings, conduct restoration work, or if protected by at least 1 foot of packed snow or 2 inches of frozen soil. Before heavy equipment or vehicles would be allowed to cross streams, the project Fisheries Biologist or Hydrologist would be consulted to determine where crossings would occur or be constructed, and to specify any stipulations necessary to minimize negative impacts on aquatic resources. Heavy equipment or vehicles would not be allowed in streams during fish spawning, incubation, and emergence periods.

7. Fuel storage and refueling areas for harvesting equipment would be keep outside of the WIZ.

8. Hazard trees within the riparian buffer felled for safety should be directionally felled across the stream if the top can reach more than halfway across. Trees would otherwise be felled on the contour.

9. Where whole-tree yarding occurs, return slash with skidder to the skid trail with each turn to keep landing size down and redistribute slash onto the skid trails to function as organic waterbars to dissipate overland flow energy (up to two tons per acre).

10. Fell, lop, and scatter vegetation onto rehabilitated roads for effective ground cover (integrate with down wood requirement).

11. Project activities would maintain a minimum of 40 percent effective ground cover in slash, coarse wood, grass, forbs, and shrubs for filtered sunlight and cooler soil surface temperatures.

12. Slash would be allowed to cure at least one year before prescribed burning so that nutrients will leach into the soil.

13. Temporary roadbeds would be subsoiled where appropriate and re-contour as needed to rehabilitate roads to near natural conditions on steeper slopes.

14. No-treatment islands would be integrated into steeper portions of ground-based logging units. Use of ground-based equipment on steeper areas should be closely monitored.

2.3.3 Fish and Wildlife Protection

1. Meet Forest Plan standards for snags by maintaining a minimum of 20-30 snags per 10 acres of varying and large diameter size class. Guidelines for snags include:

   a. Retain all soft snags (class 3, 4, and 5) except for safety hazards (Forest Plan, pg. III – 12) to the greatest extent reasonable and practical.

b. In ponderosa pine, Douglas-fir, and aspen stands retain hard snags (when they are present) greater than or equal to 12 inches diameter at breast height (dbh) or as large as available. Provide hard snags: 12 inches diameter at breast height (dbh), or larger, to a density of at least 5 per 10 acres, 10 inches dbh or larger to a density of at least 9 per 10 acres, and 6 inches dbh or larger to a density of at least 6 per 10 acres, where biologically feasible.

2. Assure that adequate down wood is retained following mechanical treatment and burning to retain an average of 50 linear feet of 12 inch diameter wood per acre in ponderosa pine, Douglas-fir and spruce-fir. In aspen and lodgepole pine, retain an average of 33 linear feet of 10 inch diameter wood per acre.

3. Pre-treatment goshawk surveys would be conducted to identify any active nests within the treatment areas. If an active nest was identified, the USDA Forest Service biologist would be notified immediately. Work would stop in that area until a USDA Forest Service biologist maps a 650 foot buffer surrounding the nest for retention (no treatment) and a 2,500 foot buffer for a no treatment timing limitation from March thru September.

4. Pre-treatment surveys would be conducted for flammulated owls. If an active nest was discovered, the USDA Forest Service biologist would be contacted immediately. Work would stop in that area until a USDA Forest Service biologist made a determination of impacts and mitigation needed.

5. Protect existing or provide for one Abert's squirrel nest tree clump (0.1 acre of 9 to 22 inch dbh ponderosa pine with a basal area of 180 to 220, if available, and interlocking canopy) per six acres in ponderosa pine (Forest Plan, pg. III – 29). In red squirrel (pine squirrel) habitat, intact tree retention groups would be centered on existing food caches (middens). These intact tree retention groups would be at a minimum 6 large (less than 9 inches dbh) trees with interlocking canopies up to 2 ½ acres in size depending on quality of habitat (concentration of middens).

6. Avoid disturbing elk calving and mule deer fawning concentration areas between May 15 and June 30.

7. To the extend practical and feasible, restrict mechanical treatments (logging/thinning activities) and prescribed burning from May 1 to August 15 in order to avoid disrupting migratory bird nesting and breeding

8. Nesting/denning sites would be reported to the Wildlife Biologist and appropriate protection measures would be implemented.

9. If new site information regarding threatened, endangered, proposed, or Regional Forester's sensitive species is located during the course of ground disturbing activities, all work in the vicinity of those species would cease and the appropriate specialist would be notified.

10. Leave higher densities of trees around rock outcrops (except specific areas that may be opened to enhance scenic quality), resembling natural fire patterns.

11. Consult a fisheries biologist if barriers to fish passage are identified (created) during roadwork. Barriers would be evaluated and redesigned if they are suspected to have unacceptable impacts on fish.

12. Mechanical thinning treatments would not occur inside the WIZ as delineated by a Fisheries Biologist or Hydrologist. If the area has not been delineated, then treatments would occur outside a 100-foot buffer from all perennial and intermittent streams. Some activities such as prescribed burning and hand treatments may be allowed in the WIZ, but only after consultation and concurrence with the project Hydrologist or Fishery Biologist.

13. Preble's habitat as mapped by the USFWS as suitable habitat will be considered occupied by Preble's Jumping Mouse unless a trapping survey, conducted in accordance with the current survey guidelines for the Preble's Meadow Jumping Mouse, as defined by the USFWS indicates that Preble's are not present at the site. For mapped areas, the following measures apply:

    a. Habitat includes riparian and upland vegetation within a 300-foot buffer from the exterior boundary of the 100-year floodplain. Where the 100 year floodplain is not definable habitat includes 300 feet

from the outside edge of the riparian vegetation. For critical habitat, the outward extend to habitat is dependent on steam order.

b. For upland habitat within the floodplain and designated buffer :

   i. Prescribed burns, thinning, and slash treatments will only be conducted during the hibernation period of November 1 to April 30. Avoid damaging the shrub and tree components within this buffer at all times.

   ii. Do not allow ground disturbance from vehicles or falling trees except for access routes.

   iii. Impacts to shrubs in upland areas by vehicles and associated logging equipment will be minimized. No shrubs will be uprooted.

c. For riparian habitat within the floodplain and designated buffer :

   i. No riparian vegetation shall be removed or uprooted. Where conifer removal is determined to be biologically warranted within the 300-foot buffer, tree removal will be done with minimal disturbance to the herbaceous, shrub, and remaining tree vegetation.

   ii. Prescribed burns will not be lighted in Preble's riparian habitat, although backing fires and light understory burns may enter riparian vegetation may be allowed on a limited basis.

   iii. Use existing roads. Where these are not available, minimize the number of crossing access routes. Locate access routes on sites with little vegetation and avoid riparian shrub habitat if possible. When not possible, efforts will be made to minimize impacts. Prior to impact, the USFS and the Service will review any proposed drainage crossing that would cause a disturbance or removal of Preble's riparian habitat.

   iv. Once the drainage crossing is no longer needed to complete forest treatments, the crossing will be allowed to reclaim itself. If reestablishment or the riparian vegetation on the drainage crossing is not reclaimed to pre-disturbance conditions within 3 years, further reclamation work may be needed and will be mutually coordinated with the FS and the USFWS. Revegetation work using conventional equipment to reshape sediment deposits or install rock/logs to stabilize stream channels may be allowed on a limited basis. Revegetation of access routes will be conducted with native seed or live willows as appropriate.

14. Mexican spotted owl (MSO) protection criteria:

   a. No treatment would occur within Protected Activity Centers (PACs)

   b. A qualified biologist would conduct site visits to all the proposed treatment areas that are mapped as MSO protected or restricted habitat to determine if the site can provide suitable MSO habitat. If so, the following criteria apply:

      i. Within MSO Protected habitat areas outside of PACs (including mixed conifer and pine/oak habitat with slopes of greater than 40 percent where timber harvest has not occurred in the past 20 years):

         (1) No harvest of trees greater than nine inches dbh is allowed.

         (2) A combination of thinning trees less than nine inches dbh, treatment of fuels, and prescribed fire can be used to reduce fire hazard and to improve habitat conditions for owl prey. Habitat components that should be retained or enhanced include large logs (greater than 12 inch midpoint diameter), grasses and forbs, and shrubs. Emphasis of the spatial configuration of treatments should be to mimic natural mosaic patterns.

         (3) Prescribed natural fire (i.e., wildland fire use) is permitted as is the creation of fuel breaks on a case-specific basis.

         (4) On steep slopes treated to reduce fire risk, either by the use of prescribed fire alone or in conjunction with removal of stems and ground fuels, pre-and post treatment monitoring of

habitat conditions should be done. Specific habitat characteristics to be measured include fuel levels, snag basal area, volume of large logs (>30 cm midpoint diameter), and live tree basal area.

ii. Within MSO Restricted habitat areas:

(1) Emphasize uneven-aged management systems. If even-aged stands are included, extend rotation age to greater than 200 years. Retain trees greater than 24 inches dbh unless overriding management situations require their removal to protect human safety and/or property.

(2) Except for treatments designed to reduce the risk of catastrophic wildfire retain hardwoods, large down logs, large trees (greater than 18 inches dbh), and snags. Within treatment areas designed to reduce risk of catastrophic wildfire in restricted stands, hardwoods, large down logs, large trees (greater than 18 inches dbh) and snags are retained to an extent that does not significantly impede the overriding objective of reducing the risk of catastrophic wildfire in owl habitat.

(3) No stand that meets threshold conditions can be treated in such a way as to lower that stand below those conditions until ecosystem assessments can document that a surplus of these stands exist on larger landscape levels (e.g., no less than the size of a FS District). This does not preclude use of treatments to reduce fire risks or lessen insect or disease problems, nor does it preclude management to meet other ecosystem objectives as long as stand-level conditions remain at or above the threshold values shown in Table III.B.1 of the MSO Recovery Plan.

iii. Prior to project implementation, all areas that were determined to contain suitable MSO breeding habitat based on review by qualified biologists should be surveyed as necessary according to U.S. Fish and Wildlife Service protocol (2003), if MSO are present at a site, then the site becomes a PAC and specific guidelines as established in the 1995 MSO Recovery Plan would be followed.

15. In greenback cutthroat trout watersheds, the project fisheries biologist and silviculturist would be consulted to determine suitable thinning activities and locations if any. To avoid adverse effects on aquatic resources: Only hand-thinning treatments would occur in these watersheds. No mechanical thinning treatments would be allowed. No broadcast prescribed burns would be allowed in these watersheds.

    a. Hand treatments may be allowed in the WIZ, but only after consultation and concurrence with the project Hydrologist or Fisheries Biologist. Pile burning would not be allowed in the WIZ.

    b. Cut trees would be piled and burned. New techniques are currently being researched to improve the recovery of pile-burned soils and reduce the risk of invasive species. As best available science, these techniques would be implemented on site.

16. A few piles would be left in each treatment area for wildlife habitat. Piles to be left would be determined by fire/fuels personnel and would not contribute to hazardous fuel loading.

2.3.4 Sensitive Plants, Range Resources, and Noxious Weeds

1. Require contractor/purchaser to use designated skid trails, landings, and travel routes that would avoid spreading weeds from infested areas.

2. Require contractor/purchaser to clean all heavy equipment that operates on USDA Forest Service projects before entering treatment areas in compliance with established contract language. Require contractor/purchaser to reseed disturbed roadbeds with a certified noxious weed- free native seed mix. All hay, straw, and mulch used for revegetation or watershed protection measures on National Forest System lands will be certified as noxious weed-free.

3. Conduct pre- and post-project field surveys as needed to identify and treat noxious weeds in proposed treatment areas until controlled or eradicated.

4. Test seed mixes for cheatgrass seed. No cheatgrass seed should be present.
5. Conduct field surveys to locate specific special plant species as indicated in the BE/BA as needed, and determine the appropriate management activity.

2.3.5 Air Quality

1. Any burning would follow all State and local laws and air quality permit restrictions
2. Machine piles would be clean of dirt.
3. Monitoring as required would occur per permitting process, depending on category of burn.

2.3.6 Recreation Management

1. Review motorized travel corridors in the selected alternative to assure that adequate screening is retained to reduce risk of increased off-road use as well as routes that have been closed as depicted on the National Visitor Use Monitoring (NVUM) system.
2. Review non-motorized trail corridors, both system and non-system in the selected alternative to assure that adequate screening is retained on system trails and minimize user conflicts and warn visitors of potential safety issues. Signage should be posted in appropriate locations warning users of treatment activities.
3. Maintain a visual screen within 200 feet of natural openings to deter off-road/trail use. Install physical barriers along roads in areas where illegal off road use is likely to occur.
4. Attempt to close treatment units to dispersed recreational activities during implementation. Provide notice of such closures at the District office, on the forest web page, and in visible locations near the treatment units and along main roadways.
5. Notify all potentially impacted Special Use Permit holders of pending activities near or within their areas of operation.
6. Use boulder and earthen barriers, fencing, slash, etc. to deter access to treatment areas during implementation if monitoring shows that unwanted use is occurring.
7. Favor winter logging to reduce resource impacts.
8. Do not place merchantable materials or slash on developed recreation sites, at recreation staging areas or trailheads, or trail corridors.
9. Haul routes should be clearly identified and considerations for impacts to recreationists identified. Routes should be used Monday through Friday only.
10. Do not close developed recreations sites between Memorial Day and Labor Day.
11. Use appropriate signing, traffic control, and area closures, and provide advance information to user groups about closures to adequately protect public safety. Increase public education about road closures and appropriate uses.
12. Meet all applicable laws regarding safety; follow Occupational Safety and Health Administration (OSHA) and State safe work practice guidelines.
13. Restrict operations on weekends and holidays as needed to reduce user conflicts.

2.3.7 Visual Quality Management

The following recommendations apply to areas in the immediate foreground (within 300 feet or sight distance, whichever is less) of Pikes Peak Highway and other federally designated scenic highways and trails, and developed campgrounds and trailheads in order to meet Forest Plan Visual Quality Objective of Retention. For treatment areas located within 300 feet of other forest roads, Colorado State Route 24, and any other roads, the following guidelines would be implemented to meet a Forest Plan VQO of Partial Retention. A landscape architect or recreation specialist would help determine site-specific methods to meet retention guidelines.

1. Mark trees on the side away from roads, campgrounds and trails for 300 feet or sight distance.
2. Mark cut trees instead of leave-trees where reasonable. The objective is to reduce marking paint visibility to the casual observer.
3. Vary spacing and blend thinned areas with untreated areas.
4. Leave stumps no higher than eight inches.
5. Bury or scatter stumps that are pulled up as a part of roadwork. Leave trees in natural patterns around rock outcrops.
6. Retain elements of a park-like setting (larger ponderosa pines, random tree spacing, understory grasses and shrubs) for visual variety.
7. Return skid trails to as near natural condition as possible.
8. Slash depth would be retained at less than 18 inches and scattered to mimic natural surroundings.

2.3.8 Other Concerns

1. Special use permittees and those with Rights-of-Way would be contacted before implementation to avoid conflicts with the selected alternative.
2. Provide wood products, including firewood, consistent with demand and treatment prescription.
3. Pursue standard contracts/agreements relative to County Road maintenance and damage.
4. Perform heritage resource surveys and protect known sites. Meet Memorandum of Understanding for National Fire Plan projects.
5. Use appropriate signing, traffic control, and area closures, and provide advance information to user groups about closures to adequately protect public safety. Increase public education about road closures and appropriate uses.
6. Meet all applicable laws regarding safety; follow OSHA and State of Colorado safe work practice guidelines.
7. A spill plan would be part of contracts used to implement this project. Respond to neighbors' concerns identified as part of implementation planning.
8. Encourage and provide opportunities for citizen involvement in planning, implementation, monitoring, and adaptive management (the public may contact Pikes Peak District Assistant Fire Management/Fuels Officer, Bob Ayotte, at 719-477-4216 for further information).

2.4 Monitoring

Two types of monitoring activities are identified: implementation and effectiveness. The intent of monitoring and adaptation is to allow land managers to respond to changed conditions and new information during the project implementation period. Options for how to best implement the project exist and would continue to evolve. The following are the outlines of monitoring for project area resources to ensure resource management objectives are achieved.

1. In addition to pre and post implementation monitoring for Threatened and Endangered species, monitor Management Indicator Species (MIS) and Regional Forester's Sensitive Species that may be directly affected by the project. Species that will be monitored in the project area include: Abert's squirrel, brook trout, elk, green back cutthroat trout, flammulated owl, olive-sided flycatcher, northern goshawk, American three-toed woodpecker, and Rocky Mountain bighorn sheep.
2. If MIS or Regional Forester's Sensitive Species are found during monitoring surveys, then apply the following protection measures as appropriate:
    a. No ponderosa pine with signs of active Abert's squirrel nesting or feeding will be cut.
    b. No elk calving concentration areas will be modified or disturbed from May 15 – June 30.
    c. No treatment activities will occur within a 650-foot buffer surrounding active northern goshawk nest sites.
    d. No treatment activities will occur within a 2,500-foot buffer surrounding active northern goshawk nests during post-fledgling periods (March thru September).
    e. Protect other raptor nesting sites using measures similar to those for goshawk.
    f. Apply Forest Plan standards and guidelines for wildlife and fish.
3. If the Forest Plan general directions, standards, and guidelines for wildlife and fish resources and habitat improvement and maintenance are not achieved, then:
    a. Reduce or modify vegetation treatment operations and/or
    b. Increase species monitoring to determine the source of impact and apply appropriate mitigation.
4. Monitor vegetation and noxious weeds. If the Forest Plan general directions, standards, and guidelines for habitat improvement and maintenance are not achieved, then:
    a. Reduce or modify vegetation treatment operations and/or
    b. Increase use of noxious weed control measures
    c. Increase noxious weed monitoring to determine the source of impact and apply appropriate mitigation.
5. Monitor soil erosion and water quality, including implementation and effectiveness of water conservation practices and other mitigation. If the Forest Plan general directions, standards, and guidelines for soil and water resources are not achieved, then:
    a. Reduce or modify vegetation treatment operations and/or
    b. Increase soil and water quality monitoring to determine the source of impact and apply appropriate mitigation.
6. Monitor off-highway vehicle (OHV) use within the treatment area. If the Forest Plan general directions, standards, and guidelines for dispersed recreation, including OHV use, are not achieved, then:
    a. Scarify, seed, and block unauthorized OHV trails and/or

b. Gate and/or sign with "closed to motor vehicles" to discourage use of temporary roads or unauthorized OHV trails and increase law enforcement.

2.5 Alternatives Considered but Eliminated from Detailed Consideration

The ID team considered five potential alternatives raised by scoping comments. A brief description of each of these alternatives and the rationale for not carrying them forward for detailed analysis follows:

2.5.1 Greenback Cutthroat Trout Protection

This alternative would protect Greenback cutthroat trout populations and habitat in the Catamount Project Area. Alternative B (Proposed Action) proposes limited actions in Severy Creek, Bear Creek and North Cheyenne Creek (see Item 15 under 2.3.3 Fish and Wildlife Protection) and the watershed protection approaches that are proposed would provide decreased sediment from wildfires that would benefit Greenback cutthroat trout. Therefore, the ID Team decided that the Greenback protection theme was already incorporated in the proposed action.

2.5.2 Wildland/Urban Interface Actions Only

One of the comments suggested that the project should concentrate on actions within close proximity of structures within the WUI. The ID Team discussed this theme and agreed that this approach would not address the purpose and need because it would not provide adequate watershed protection. Therefore, this alternative was not further considered.

2.5.3 Expand Watershed Protection Treatments into Roadless Areas

One of the alternatives that the ID Team discussed was to expand the Proposed Action into Roadless Areas because those areas would provide additional watershed protection benefits despite some limitations on road access and the requirement of Regional Office approval. The Roadless Areas were examined and the ID Team determined that there are very few acres in Roadless Areas that fall into the target vegetation types in the proposed action.

2.5.4 Expand Watershed Protection Treatments into Subalpine Areas

Several of the key water supply reservoirs that were rated as highest priority in the Pikes Peak Watershed Assessment have extensive watershed areas above them that are mostly in the subalpine vegetation zone. These areas were examined to determine if additional watershed protection could be achieved by vegetation treatments in those areas. The ID Team determined that wildfires would not likely start in the subalpine zones but would more likely travel from the montane forest below. Therefore, the watershed protection treatments

in the proposed action would provide effective treatment because they would reduce the intensity of wildfires burning into the subalpine zone. The logistics, steep ground and lack of roads, in the subalpine zone would also be a challenge.

2.5.5 Expand Proposed Action to include Bighorn Sheep Habitat Improvements

The Colorado Division of Wildlife (CDOW) presented opportunities for bighorn sheep habitat improvement in the project area. Some of these opportunities could fit into the purpose and need of the project where they would occur within the current proposed action. However, expanding beyond the existing approach of wildfire hazard reduction and watershed protection would go beyond the current purpose and need. Therefore, working with the CDOW was added to the Proposed Action, but no additional areas of Bighorn sheep habitat improvement.

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Chapter 3. Affected Environment and Environmental Consequences

This section describes the affected environment and discloses potential effects of the proposed action and each alternative. It forms the scientific and analytical basis for the comparison of the potential environmental effects of the alternatives. In determining potential environmental consequences of each alternative, the interdisciplinary team considered the following:

1. The probable consequences of each alternative on environmental resources.
2. Achievement of project objectives.
3. Adherence to Forest Plan standards, guidelines and objectives.
4. Compliance with federal and state laws and regulations.

3.1 Background

The historical montane forest was likely quite open with fewer trees, greater age diversity between stands, and larger openings than the area displays today. Under historical conditions, studies have indicated that fire typically served to maintain open mature stands, as well as to maintain some areas as openings. Brown et al. (1999) and Kaufmann et al. (2000) provide evidence that frequent, mixed severity fires characterized the ponderosa pine stands from 1000 to 1870. Although there were areas of severe fires, these areas were relatively small in extent and critical in creating openings of 20 to 40 acres that were maintained by the dry site conditions until regeneration occurred. The open forest was protected from extensive fires because of the distance between tree crowns and the openings (USDA Forest Service 2002a).

Smaller fires that did not move into the crowns would have limited the growth of Douglas-fir, which does not tolerate fire well, to sites where fires were infrequent, particularly wetter, north-facing slopes. The smaller fires would also have kept the forest more open by limiting the growth of understory trees.

Frequency and fire patterns created a varied vegetative pattern across the landscape. This mosaic pattern would be maintained as the patch-like variations of age classes, densities, and openings caused fires to skip around rather than kill all trees over large areas. Some stands would have had a multitude of age classes from seedlings to trees more than 400 years old. There were probably few snags (standing dead trees) and cavities in live trees. A few stands would have been nearly even-aged due to stand-replacing fires followed by even-aged regeneration.

One key to the sustainability of the pre-European forest was the open condition. The open forest would have been somewhat protected against extensive fires because of the distance between tree crowns and larger openings. The relatively frequent surface fires that consumed fine grasses and forbs kept fire intolerant wood species from creating ladder fuel build up. Openings may have covered 20 to 25 percent of the area, and some of these openings may have persisted for decades due to climatic and seed source limitations. Regeneration would have begun immediately on other burned sites. Therefore, post-fire patterns of regrowth would have resulted in variations both in space and time, contributing to the complexity of the landscape.

Fire has also been important in maintaining the vigor and extent of aspen. Aspen in this area have been maintained by suckering from long-lived clones that prosper following fire. Aspen provides many benefits to the landscape, including natural fuel breaks, species diversity and important wildlife habitat. Bartos (2001) argues that aspen has declined by 49 percent in Colorado due to encroachment by conifers. Other researchers (Kulakowski and Veblen 2006) do not agree that aspen has been reduced in extent to the magnitude suggested by Bartos. However, the occurrence of large and severe fires would increase the extent of aspen and the lack of fires would allow the successional replacement of aspen by conifers (Veblen and Donnegan 2005). Disturbance regimes in aspen are generally similar to the conifer stands that are next to them (Veblen and Donnegan 2005). In the Project Area, aspen are present next to ponderosa pine and mixed conifer forests that have mixed severity fire regimes with fire return intervals of between 30 and 100 years. Therefore, aspen stands have likely experienced fewer disturbances in the past 100 years due to fire suppression than would be expected. Existing stands of aspen are also experiencing SAD, which may be linked to reduced vigor due to the age of the aspen stands.

Mixed conifer areas are generally composed of limber pine, Douglas-fir, white fir and some ponderosa pine. The disturbance regime was mixed-severity fires with a fire recurrence interval of 30-100 years (Crane 1982). Therefore, they contained a mosaic of conditions composed of structural stages ranging from young to old trees. Stands were variable but generally uneven-aged and open, with occasional patches of even-aged structure. Denser tree conditions existed in some locations such as north facing slopes and valley bottoms. The historical pattern would be small clumps and groups of trees interspersed within variable-sized openings of grasses and shrubs.

In the subalpine forest, fire would also have been the major disturbance factor; however, windthrow and insect outbreaks may also have contributed to disturbance patterns. Fires in the subalpine zone appear to have been less frequent and more catastrophic. A typical fire pattern would be a stand-replacing crown fire that caused extensive mortality followed by a long (up to 300 or more years) fire-free period. This would result in the establishment of even aged lodgepole pine or aspen stands which are able to quickly establish after intense burns. Other areas would have been colonized by a mixture of lodgepole pine, aspen and Engelmann spruce while some of the more exposed sites may have been re-vegetated by limber pine. Over time, Engelmann spruce and subalpine fir would become established as an understory and eventual climax species on most of these sites.

A landscape assessment of the Catamount area was completed in 2008 (USDA Forest Service 2008) that has defined some of the issues and provided valuable preliminary analyses. The Pikes Peak Watershed Assessment (JW Associates 2009) provides an analysis of the hazards of wildfire to water supply watersheds in the

Catamount Project Area. These documents and others referenced below provide the basis for the environmental consequences presented in this section.

3.2 Vegetation

The vegetation section is divided into two sections. The first section is forest vegetation which has been described in some detail in Sections 1.1 through 1.3 in Chapter 1 and Section 2.2.2 in Chapter 2. The other section addresses special status plants. The discussion is summarized from the Catamount Forest Health & Hazardous Fuels Reduction Project Silviculture Specialist Report (JW Associates 2010a) and the Catamount Forest Health & Hazardous Fuels Reduction Project Botany Specialist Report (USDA Forest Service 2010a).

3.2.1 Forest Vegetation Affected Environment

Cover Types

Cover types are used to describe the vegetation that currently occupies a site. They are named for the dominant vegetation occupying a site. The Catamount Project Area is dominated by forest vegetation (Table 2). Limber pine, Engelmann spruce-subalpine fir, ponderosa pine, aspen, Douglas-fir and bristlecone pine are the major forest cover types present in the area (Figure 4). Lesser amounts of lodgepole pine, pinyon-juniper, and blue spruce cover types also occupy sites within the Catamount Project Area.

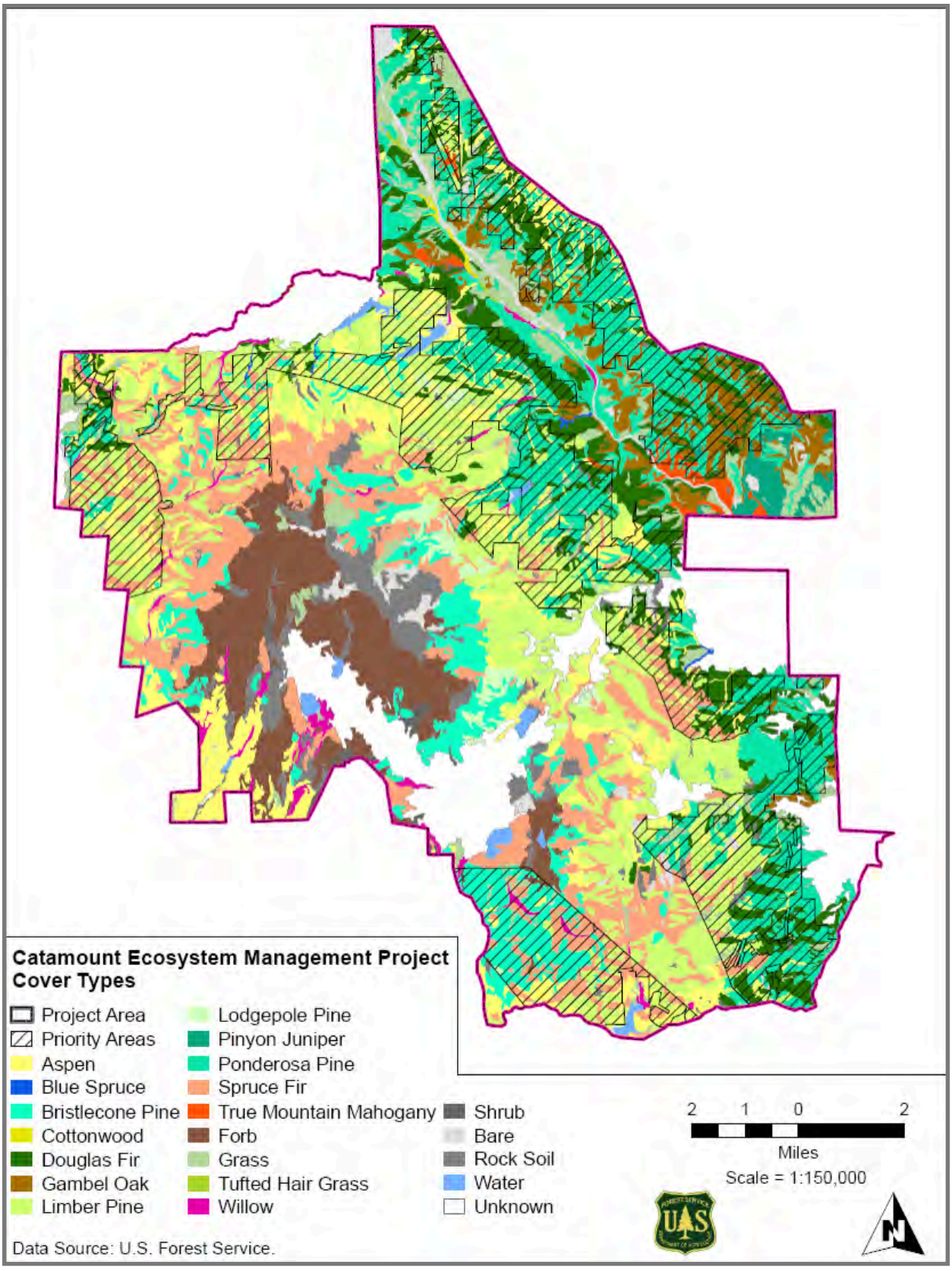

Figure 4. Cover Types of the Catamount Project Area

Table 2. Catamount Project Area Cover Types[1]

Cover Type	Project Area (acres)	National Forest (acres)
Limber Pine	16,489	14,164
Spruce-Fir	11,543	10,343
Ponderosa Pine	12,992	9,530
Aspen	9,964	8,299
Forb	7,345	6,486
Douglas-fir	9,142	5,984
Bristlecone Pine	6,107	5,621
Rock Soil	3,793	3,090
Grass	5,552	2,283
Gambel Oak	3,484	1,471
Lodgepole Pine	873	800
Bare	1,585	706
Willow	924	526
Shrub	377	221
True Mountain Mahogany	568	167
Water	639	91
Tufted Hair Grass	207	88
Pinyon Juniper	877	80
Blue Spruce	80	25
Cottonwood	97	0
No data	11,542	57

Natural and man induced disturbances affect what types of vegetation develop in an area and plant succession. The most important natural disturbances affecting forest succession in the montane zone of the Colorado Rockies are fire, insect outbreaks and windstorms (Veblen and Donnegan 2005). Humans have affected the forest vegetation of the region through logging, live stock grazing and fire suppression. In their discussion of historical fire regimes of the ponderosa pine forest of the area Kaufmann, Veblen, and Romme (Kaufmann et al. 2006) divide the montane zone into the lower montane and upper montane zones. Table 3 is based on Veblen and Donnegan (2005) who describe the historical vegetation of the National Forests of the Colorado Front Range and compares the current forested landscape with conditions found from 1500 to 1850 AD.

1 The Project Area column includes all ownerships and the National Forest column includes only National Forest System lands in the Catamount Project Area.

Table 3. Comparison of the Current Forested Landscape to the Range of Landscape Variation Expected[2]

Zone and Main Cover Types	Historical Landscapes	Current Landscapes
Lower Montane Ponderosa pine	**Pattern**: Open woodlands of ponderosa pine, extensive grasslands, riparian forests, small dense patches of ponderosa, shrublands. **Mechanisms**: Moderately frequent low-severity fires maintained open pine woodlands; patches of higher severity fires resulted in openings or dense regeneration of pines or shrubs.	**Pattern**: More continuous forest cover and generally denser pine stands than occurred historically. Extreme conversion and fragmentation of natural landscape. **Mechanisms**: 20th century fire exclusion, late 19th and early 20th century grazing and logging conducive to ponderosa pine establishment. Widespread exurban development.
Mid and Upper Montane Ponderosa pine Douglas-fir / mixed conifer	**Pattern**: Heterogeneous landscape mainly of ponderosa pine dominated patches of variable sizes and ages, Douglas-fir on more mesic sites, openings consisting of grasslands and severely burned former forest sites. **Mechanisms**: A variable severity fire regime in which forest structure was shaped mainly by severe fires; low-intensity fires were less significant in forested areas but probably important in meadows.	**Pattern**: Still highly heterogeneous landscape in relation to site conditions influencing stand densities and composition, but much less heterogeneous forest stand ages mostly dating from c. 1850 to 1920. Meadows persist but show limited tree encroachment. Relative dominance of ponderosa pine and Douglas-fir not significantly changed from the historic landscape. **Mechanisms**: Major influence of severe, widespread fires of the 2nd half of the 19th century reflected in even-aged post-fire stands; relatively young stands also triggered by logging and other anthropogenic disturbances. Substantial exurban development.
Subalpine Lodgepole pine Aspen Spruce-fir	**Pattern**: Very large patches of even aged forests varying in composition from pure lodgepole pine or aspen to spruce-fir. **Mechanisms**: Infrequent, high severity fires followed both by successional replacement of species or recovery to the same dominant tree species according site conditions and seed/sprout availability.	**Pattern**: Relatively unchanged from the historical patterns except where logging or exurban development has affected limited areas. **Mechanisms**: Fire regimes have not changed significantly from the historic fire regime of large fires occurring at highly variable intervals.

Habitat Structural Stages

Habitat structural stage is a way of describing the successional stage of forest stands based on tree size and crown cover. The seedling-shrub stage describes areas that are predominantly shrub or tree seedlings. Sapling-pole stands are forest stands that are dominated by small to medium sized trees ranging from 1 to 9 inches in diameter. Mature stands are forest stands composed of older trees that are generally 9 inches in diameter or bigger. Crown cover is used to describe stand density or how open or closed the tree crowns are within a stand. The total crown closure of an area cannot exceed 100 percent. Research of historical conditions of ponderosa pine forests of the region has estimated that the typical crown cover was 25 to 30 percent, although higher densities may have characterized some ponderosa pine stands in the upper montane.

[2] from Veblen and Donnegan 2005

Ponderosa pine stands within the montane zone of the Catamount Project Area are predominately mature but sapling-pole sized stands are also present (Figure 5). No areas with established seedlings were identified. However, it is likely that pine seedlings are present within some of the older structural stages. Most of the sapling-pole stands have a crown cover greater than 40 percent while the mature stands have an almost equal amount of area within the two crown cover classes. While there is some variety of structural stages within the ponderosa cover type, the historic landscape most likely would have had a greater proportion of area with less than 40 percent crown cover and more openings. The denser ponderosa pine stands found within the Catamount Project Area create conditions suitable for large stand replacing fires to occur. Denser canopies with smaller understory trees help fires reach the crown level. Because of this shift in stand conditions, large stand replacement fires within this cover type in the region have become more common in recent years (USDA Forest Service 2002a).

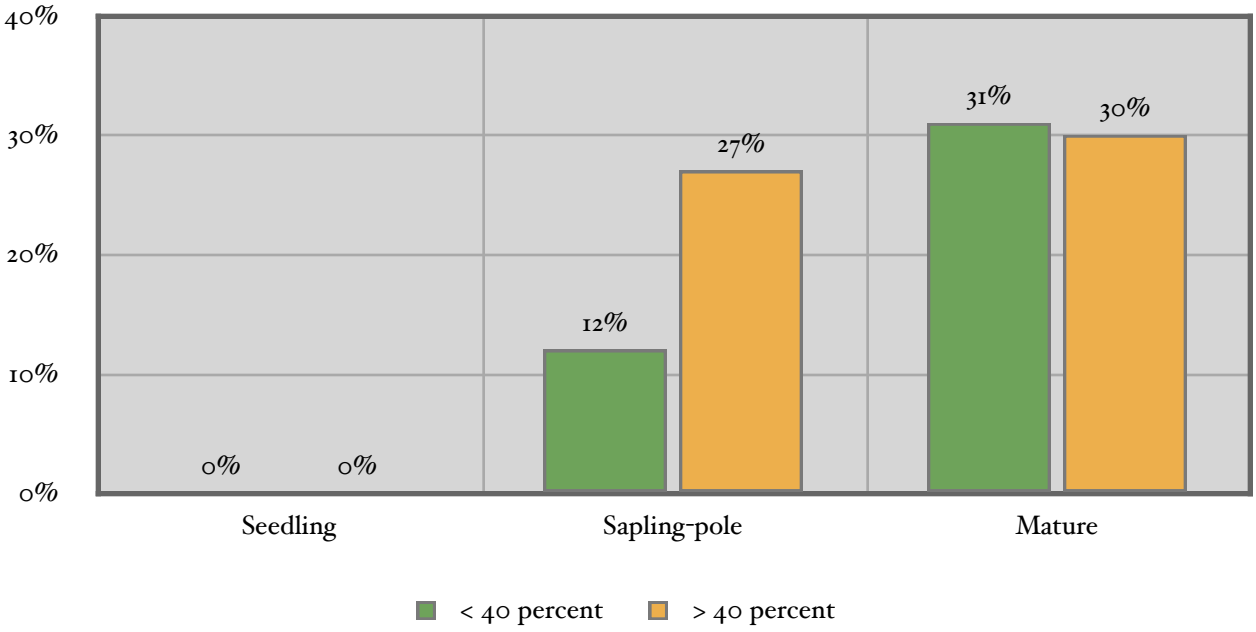

Figure 5. Existing Structural Stages for Ponderosa Pine - Montane Zone

Figure 6 displays the habitat structural stages and crown cover for the Douglas-fir and limber pine forests of the montane zone. These cover types represent the mixed conifer stands within this zone. Mixed conifer areas are generally composed of limber pine, Douglas-fir, white fir and some ponderosa pine. Currently there is slightly more area within the sapling-pole stage than the mature stage. Eighty-six percent of the mixed conifer area has a crown cover greater than forty percent.

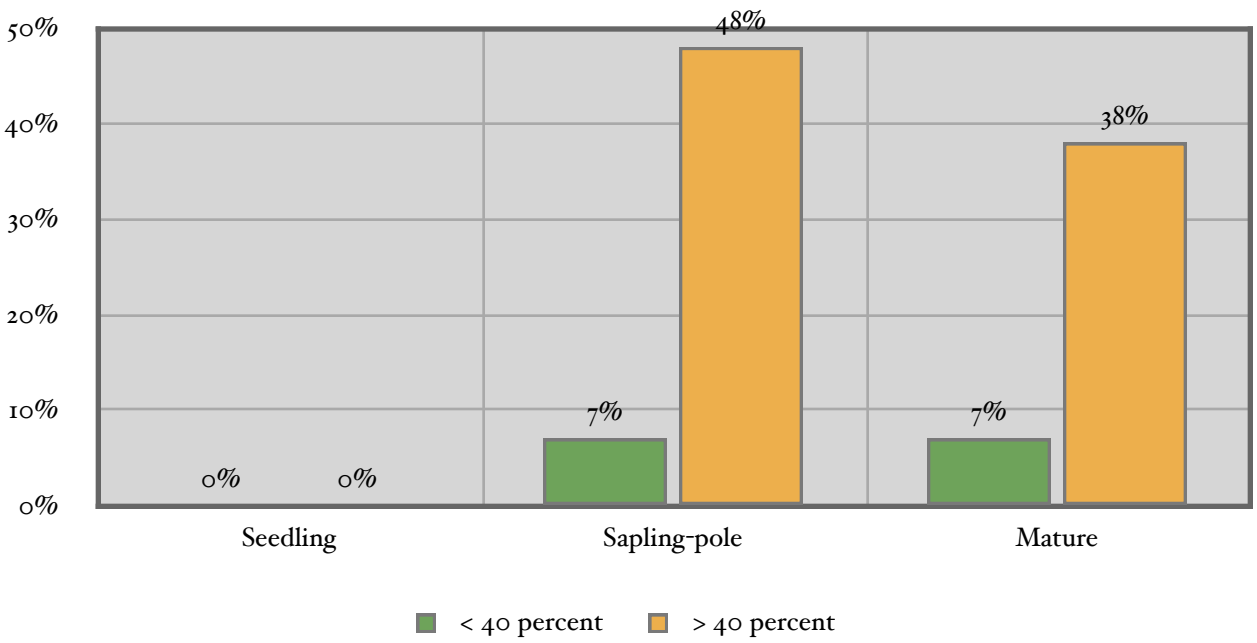

Figure 6. Existing Structural Stages for Douglas-fir/Limber Pine - Montane Zone

Historically, the disturbance regime for mixed conifer stands of the area was mixed-severity fires with a fire recurrence interval of 30-100 years (Crane 1982). Therefore, a mosaic of conditions composed of structural stages ranging from young to old trees was typical of the mixed conifer areas of the montane zone. Stands were variable but generally uneven-aged and open, with occasional patches of even-aged structure. Denser tree conditions existed in some locations such as north facing slopes and valley bottoms. It is likely that a greater proportion of the mixed conifer forest within the Catamount Project Area today have higher densities (crown cover) than would have existed under the historic disturbance regimes.

Fifty percent of the National Forest lands in the Catamount Project Area are within the subalpine vegetation zone. The subalpine zone is typically dominated by tree species that are adapted to cooler environments and a shorter growing season found at the higher elevations. The subalpine forest of the Catamount Project Area is predominately limber pine, Engelmann spruce and subalpine fir. Aspen and bristlecone pine forest stands are also common within this zone.

Historically fire was a major disturbance factor within the subalpine forest although, windthrow and insect outbreaks also contributed to disturbance patterns. Fires in the subalpine zone appear to have been less frequent and more catastrophic than at lower elevations. A typical fire pattern would be a stand-replacing crown fire that caused extensive mortality followed by a long (up to 300 or more years) fire-free period. This would result in the establishment of even aged lodgepole pine or aspen stands which are able to quickly establish after intense burns. Other areas would have been colonized by a mixture of lodgepole pine, aspen and Engelmann spruce while some of the more exposed sites may have been re-vegetated by limber pine. Over time, Engelmann spruce and subalpine fir would become established as an understory and eventual climax species on most of these sites.

The limber pine and spruce-fir stands of the subalpine zone in the Catamount Project Area are predominately dense stands with a greater proportion of sapling pole stands than mature stands (Figure 7). The structure of the subalpine forest of the Catamount Project Area appears to be what would have been expected under the historic disturbance regimes. This is to be expected given the long fire return intervals of this zone. The amount of limber pine in this zone suggests that many of these forests are still relatively young and are still in transition from the seral limber pine to the more shade tolerant spruce-fir.

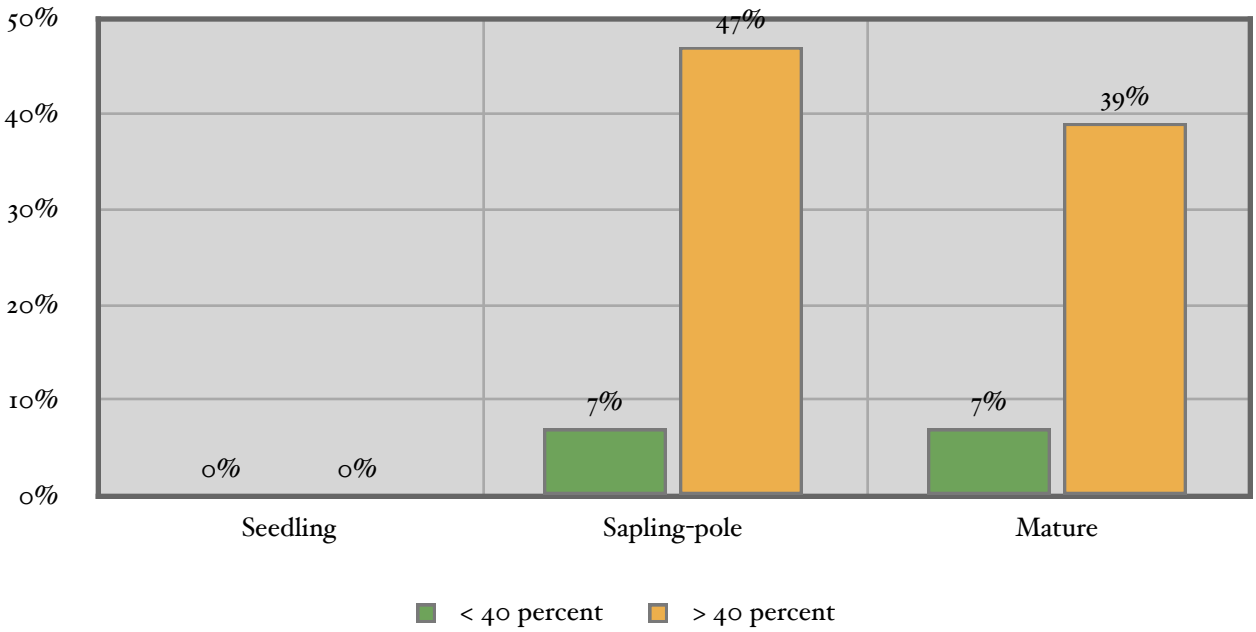

Figure 7. Existing Structural Stages for Limber Pine/Spruce Fir - Subalpine Zone

Gambel Oak

Gambel Oak is a dominant shrub species in a large portion of the xeric shrublands of the foothills. This species is a tall shrub or short tree where it occurs on the Pike and San Isabel National Forest. This species is limited at lower elevations by moisture stress and at higher elevation by competition with other species. It is probable that this cover type experienced infrequent stand replacing fires under the historic conditions (Veblen and Donnegan 2005). This shrub re-sprouts after fire from rhizomes and can recover rapidly following fire. The Gambel oak communities in the Catamount Project Area have become more decadent over time in the absence of fire. Gambel oak becomes denser as it ages and shades out grasses and other ground cover.

Aspen

Aspen provides many benefits to the landscape, including natural fuel breaks, species diversity and important wildlife habitat. The aspen cover type is common both in the upper montane and subalpine zones of the Catamount Project Area. This species is adapted to a wide range of habitats from relatively xeric sites at lower elevations to more mesic sites at higher elevations. Aspen primarily regenerates from sprouts that arise from long lateral roots often in response to disturbances such as fire or logging. This ability to sprout after fire enables this species to dominate sites following fire. Aspen typically has open canopies with high light levels in

the understory. This high light level allows for the establishment of conifers on many sites. On these sites aspen is seral to conifers and in the absence of disturbance may be replaced by conifers over time. On other sites aspen is self-replicating. Disturbance regimes in aspen, where they are seral to conifers, are similar to the conifer stands that are next to them (Veblen and Donnegan 2005).

In the Project Area, aspen in the montane zone is adjacent to ponderosa pine and mixed conifer forests that have mixed severity fire regimes with fire return intervals of between 30 and 100 years. Therefore, aspen stands in this zone have likely experienced fewer disturbances in the past 100 years due to fire suppression. In the subalpine zone the aspen cover type is adjacent to limber pine and spruce-fir stands. These areas would have much longer fire return intervals historically and are likely similar to what would have developed under the historic disturbance regimes.

3.2.2 Forest Vegetation Environmental Consequences

This section describes the effects of Alternative A (No Action) and Alternative B (Proposed Action) on the forest vegetation of the Catamount Project Area. The analysis concentrates on the potential effects of the alternatives on forest structure, and insect and disease occurrence. Forest structural stages and crown cover (stand density) are used to assess the potential effects on forest structure. The effects on insect and disease occurrence are assessed by comparing the post treatment stand characteristics to characteristics of high risk stands. The discussion of the direct and indirect effects concentrates on the effects on the forest stands within the priority treatment areas. The cumulative effects assessment includes the whole Catamount Project Area.

Effects Common to All Alternatives

Under both Alternative A (No Action) and Alternative B (Proposed Action) there would be forest stands that would not be treated. These untreated stands would include much of the subalpine zone as well as forests on steep slopes, areas set aside to meet fish and wildlife management objectives, and to protect riparian areas and water quality. In the absence of disturbance, these untreated stands would continue to mature and succeed to more shade tolerant species over time (see discussion below).

Alternative A (No Action) - Direct and Indirect Effects

Alternative A (No Action) would have no direct short-term effects on the forest structure of the Catamount Project Area. Since no new vegetation treatments would be implemented under this alternative, the forest structure would not be directly altered. However, Alternative A could have significant indirect effects on forest structure over time. In the absence of disturbance, open early successional habitats would continue to decline as seral habitats progress toward later seral stages. This trend toward a more homogenous landscape would have the greatest impact on the vegetation of the montane zone.

Gambel Oak

Most of the Gambel oak communities in the priority treatment area have become more decadent over time in the absence of fire. Gambel oak becomes denser as it ages and shades out grasses and other ground cover. Under the Alternative A (No Action) these communities would continue to fill in and the oak shrubs would

dominate these sites. These shrub dominated areas do not provide the variety of vegetation that more seral communities do and they may be more prone to hotter wildfires due to greater volumes of woody fuels.

Aspen

Under Alternative A (No Action) the amount of aspen within the Catamount Project Area would likely decline over time. Some of the aspen stands have an established conifer component. In the absence of fire or conifer removal, these sites would eventually convert to conifers as aspen is shaded out. On sites where aspen is self replicating, sudden aspen decline may result in more open grass or shrub dominated communities developing. As the older aspen die out and new aspen sprouts are not produced; shrubs and grasses may become the dominant vegetation in these areas.

Ponderosa Pine

The dry ponderosa pine treatment area includes those areas that would have historically been characterized by very open stand conditions with frequent low severity fires. Under Alternative A (No Action) the trend toward more closed stand conditions would continue on some of these sites. In the absence of disturbance more of this area would progress to the mature stage and develop a crown cover of greater than forty percent. Openings would exist where site conditions do not support trees. However, areas that are capable of supporting trees would likely become more dense in the absence of fire or vegetation treatment. Without periodic fires, seedlings that develop in the more open areas would grow and develop into saplings and pole size trees. These denser, multi-storied stands may be more susceptible to hot fast moving crown fires due to the ladder fuels provided by the smaller under story trees. Trees within these denser stands would be under additional stress due to more competition for site resources. This additional stress can make these stands more susceptible to injury from insects, disease, and drought.

The potential changes over time within the more mesic ponderosa pine stands would be similar to the dry site pine. However, these forest stands would have had more variation under the historic disturbance regimes than was present on the dryer sites. Under Alternative A (No Action), younger sapling-pole stands would progress into the mature stage. Without disturbance most of these stands would develop a crown cover over forty percent. Over time these mesic stands would become more homogenous with less variation in density and structural stage.

The risk of loss due to mountain pine beetles would likely increase within many of the ponderosa pine stands over time as they increase in density and average stand diameter. If the population of mountain pine beetles were to increase in the area, high rates of mortality would be expected within these higher risk stands.

Mixed Conifer

Under Alternative A (No Action), the mixed conifer stands within the montane zone would continue to mature. The amount of Douglas-fir would be expected to increase on these sites as the less shade tolerant limber pine and ponderosa pine die out and are replaced by the more shade tolerant firs. In the absence of disturbance, younger stands would not be initiated and the forest stands would become more homogenous.

The Alternative A (No Action) would have no direct effect on the forest structure of the Catamount Project Area. However, it could have a profound indirect effect on the disturbance regimes of the montane zone.

Under Alternative A (No Action), forest stands of the montane zone would continue to become more homogenous with fewer and fewer openings and higher stand densities. This type of forest structure is at greater risk to large scale disturbances either by large wildfires or extensive insect and disease out breaks. This kind of disturbance regime, where large areas of forest are disturbed by high intensity and large scale events, is not typical of the historical pattern in the montane zone (Kaufmann et al. 2006, Veblen and Donnegan 2005). This type of disturbance regime creates contiguous blocks of land in the same habitat structural stage, rather than a mosaic of stand ages and structures. Although, historically, insects played a role in these forests, fire appears to have been the dominant disturbance agent. By maintaining the current stand conditions and suppressing wildfire, insects and disease may become the major disturbance agent. A long-term effect of Alternative A would be to perpetuate a trend towards a "boom and bust" cycle of disturbance between insects and disease and fire in the forests of the montane zone. This type of disturbance regime and the resulting landscape pattern is much different from the historical landscape.

Alternative A (No Action) - Cumulative Effects

The cumulative effects analysis covers a period of time starting with settlement of the area by Euro-Americans and ending 10 years into the future. The cumulative effects analysis area includes the Catamount Project Area as well as adjacent private and National Forest lands where on-going or foreseeable future vegetation management projects could affect the forest vegetation of the Catamount Project Area.

The existing condition of the vegetation within the Catamount Project Area is largely the result of past and present human activities. The Euro-American settlement of the Pikes Peak area began in the mid 1800s and brought with it mining, logging, road construction, grazing, non-native plant and animal species, human-caused fires, suppression of natural fires, and many other activities that affected the vegetation of the area. All these activities have altered the natural disturbance regimes of the forest. Several large fires are reported to have burned in the area between 1850 and 1890. Some of these where thought to have been human caused. In addition, intensive logging during this time had removed much of the commercial forests in the Woodland Park area. By the turn of the century much of the original forest vegetation had been altered through mining, timber harvesting, large wildfires, and livestock grazing. This period of extraction was followed by the establishment of the Pike and San Isabel National Forest and an emphasis on watershed protection and reestablishing the forested landscape. Tourism also increased in the area as visitors came to drive the road or ride the cog train to the top of Pikes Peak. In the twentieth century active fire suppression became another emphasis of the USDA Forest Service. The policy of suppressing wildfires over the last 100 years has resulted in many forests developing denser vegetation that would have historically been reduced by more frequent, low-intensity and mixed severity fires.

Following the period of intensive logging and wildfires in the late 1800s, there was increased erosion and a reduction in water quality as sediment from the recently logged and burned areas reached the streams and rivers. With the establishment of the municipal watersheds for the towns of Colorado Springs, Manitou Springs and Cascade, the management emphasis for the lands within the Catamount Project Area was one of maintaining forest vegetation and minimal disturbance. Because of this emphasis on maintaining water quality very few vegetation treatments or logging was conducted on the National Forest or the adjacent lands

managed by the utilities. However in more recent years some vegetation treatments been initiated to reduce the wildfire hazard in the area.

In 1984 the Colorado Springs Utilities Water Resource Department initiated a cooperative watershed management program with the Colorado State Forest Service. With the aid of the State Forest Service vegetation treatments have been implemented on lands managed by Colorado Springs Utilities within the Catamount Project Area. On-going and future foreseeable treatments on these lands include:

- 543 acres of thinning in Engelmann spruce, mixed conifer and some aspen,
- 309 acres of timber harvest in Spruce-fir
- 114 acres of prescribed burn (in an area previously thinned).

Additional fuel hazard reduction treatments may also be implemented as a result of several Community Wildfire Protection Plans (CWPP) that have been developed for communities within the area. These include the Ute Pass CWPP and the Tiller County CWPP. These treatments would be primarily within the wildland urban interface and treat areas at the lower elevations, most likely within the ponderosa pine, Gambel oak, and Douglas-fir cover types.

Just north of the Catamount Project Area, vegetation treatments have recently been implemented on several thousand acres of National Forest as part of the Trout West project. Vegetation treatments included thinning, creating openings and prescribed burning. These treatments were primarily within the ponderosa pine and Douglas-fir cover types. Forests within these recently treated areas as less dense and have more openings than what generally exists within the Catamount Project Area.

Under Alternative A, there would be no additional vegetation treatments on National Forest lands in the Catamount Project Area. While the recent and on-going vegetation treatments on private lands within the Catamount Project Area would help to reduce stand densities and create a more diverse landscape, National Forest lands account for more than 65 percent of the Catamount Project Area and 80 percent of the forested area. Without any treatments on these lands, a large portion of the Catamount Project Area would be characterized by relatively dense stands of ponderosa pine and mixed conifer.

The cumulative effect of the past, present and reasonably foreseeable future actions on the condition of the forest vegetation in the Catamount Project Area under Alternative A (No Action), is an area dominated by forest stands that are generally healthy but relatively homogenous in age and structure and increasingly at risk to insects, disease, and wildfire.

Alternative B (Proposed Action) - Direct and Indirect Effects

A variety of vegetation treatments are proposed under Alternative B (Proposed Action). This alternative would treat up to 21,100 acres in a variety of forest and vegetation types. Tree thinning, prescribed fire and mechanical fuel treatments would all be used to reduce wildland fuels, reduce the wildfire hazard, and maintain the diversity and health of the forest vegetation within the Catamount Project Area.

Gambel Oak Treatment Areas

The objectives of the Gambel oak treatments on 1,500 acres would be to create fuel breaks and improve the vigor and palatability of plants used as forage for wildlife species. Mastication and hand thinning would be used to thin or remove Gambel oak and stimulate grass and other ground cover. These treatment areas would function as fuel breaks. The proposed Gambel oak treatments would promote suckering. Therefore, the treatment area would need periodic maintenance to retain their effectiveness as fuel breaks. With treatment, these areas would be more open and likely support a greater variety of vegetation including more grasses and forbs as the overstory shade is reduced and increased sunlight is able to reach the ground vegetation.

Aspen Treatment Areas

The 2,200 acres of treated aspen would be primarily within the montane vegetation zone where they may be replaced by conifers in the absence of fire or other disturbance. Aspen stands affect by SAD are a priority for treatment. The objective of the proposed treatments within the aspen stands would be to restore the health and vigor of the existing aspen stands and expand their current extent.

The treatments would include the removal of competing conifer trees and some cutting of aspen to encourage new growth. In areas with SAD, coppice (clear cutting) may be used to promote propagation of new suckers. By reducing competition and propagating younger trees, the health and vigor of the stands would be improved and the remaining and new aspen would have increased resistance to insects and disease. Where there are inclusions of aspen within conifer stands that would be treated, the conifers would be removed from the perimeter of these inclusions to encourage the expansion of aspen clones. The preservation and expansion of these aspen inclusions would maintain some species diversity within these conifer dominated stands.

The effect of these treatments would be to maintain and, in some areas, increase the amount of aspen across the landscape. Aspen provides many benefits to the landscape, including natural fuel breaks, species diversity and important wildlife habitat.

Ponderosa Pine Treatment Areas

Alternative B (Proposed Action) would treat up to 7,800 acres of ponderosa pine; changing the structure of many these montane forest stands. The proposed actions would reduce the density of these stands and create openings ranging from 1 to 40 acres in size. In the thinned areas, smaller understory trees would generally be selected for removal, leaving larger more dominant trees. The exception would be in stands where there are only younger/smaller trees or stands with an overstory infected with mistletoe or bark beetles. In these areas, some of the healthier young trees would be left. The resulting stands would be composed primarily of mature trees with patches of immature trees scattered throughout the area, as well as many large openings. In the forested areas, canopy closure would average 25 to 30 percent. Prescribed burning, which would follow the tree cutting, would remove some of the smaller trees as well as reduce woody fuels. The proposed treatments would create patches of different structural stages in a mosaic pattern across the treated areas.

Figure 8 displays a comparison of the effects of the alternatives on structural stages following implementation of vegetation treatments. Currently 37 percent of the dry site forests have a crown cover greater than 40 percent and there are few openings or seedling dominated stands within these areas (Figure 8). Following the

implementation of the proposed treatments up to 30 percent of the area would be maintained in openings and only about ten percent of the area would have a crown cover greater than 40 percent (Figure 8).

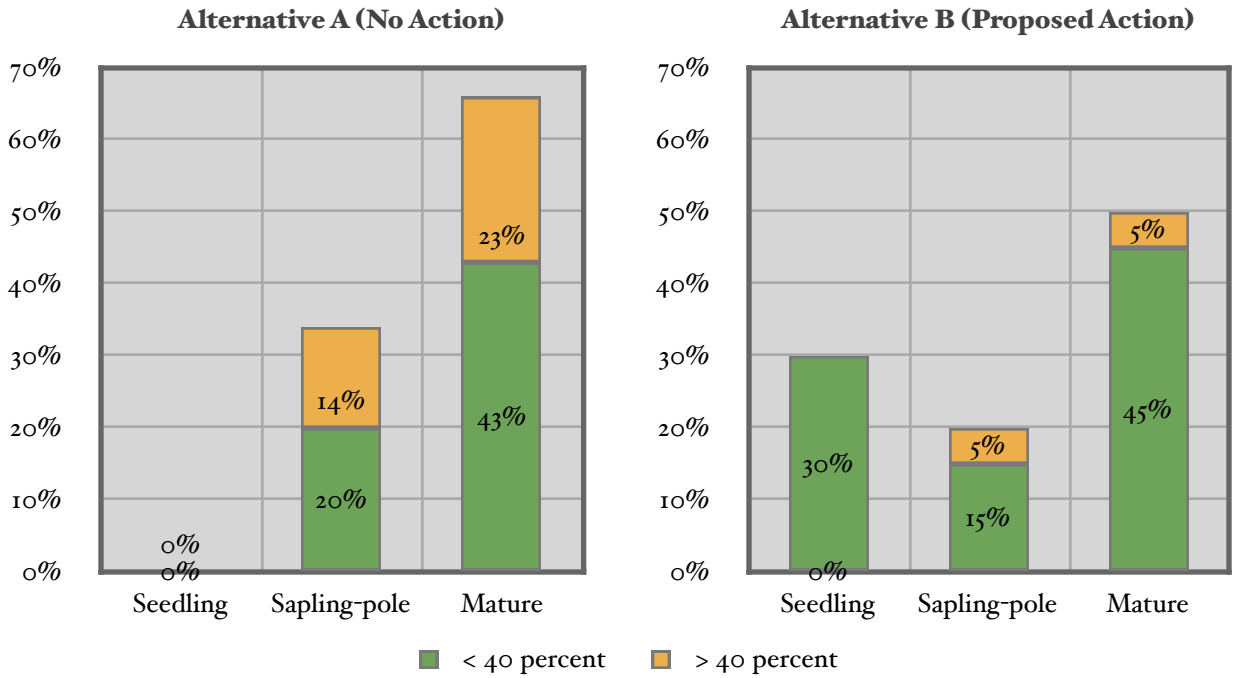

Figure 8. Estimated Structural Stages of Dry Ponderosa Pine - Alternative B (Proposed Action)[3]

The ponderosa pine treatment areas would be converted to open mature and sapling-pole forest interspersed with openings. The ponderosa pine forests in these areas would begin to resemble the historical conditions that were maintained by the natural disturbance regimes that existed prior to European settlement. The open stand conditions in thinned areas would encourage the development of understory grasses and shrubs. Overtime, this type of understory, combined with the thinned conditions, would create light ground fuels and a stand structure that could carry a low intensity fire with only occasional torching of individual crowns. If ground fires are allowed to burn through these stands occasionally, the more open environment could be maintained by discouraging the establishment of understory trees. However, if fire is suppressed and no other means is used to maintain open conditions, stands would eventually grow back to the denser conditions that exist today.

The mesic ponderosa pine areas are currently dominated by closed canopied stands with 65 percent of the area having a crown cover of greater than 40 percent (Figure 9). Like the drier sites, there are few openings within the mesic ponderosa pine areas. Following the vegetation treatments proposed under this alternative, about 20 percent of the mesic pine treatment areas would be in openings and 80 percent of the area would have a crown cover of 25 to 30 percent (Figure 9).

[3] The structural stage estimates are within the dry Ponderosa pine treatment areas only.

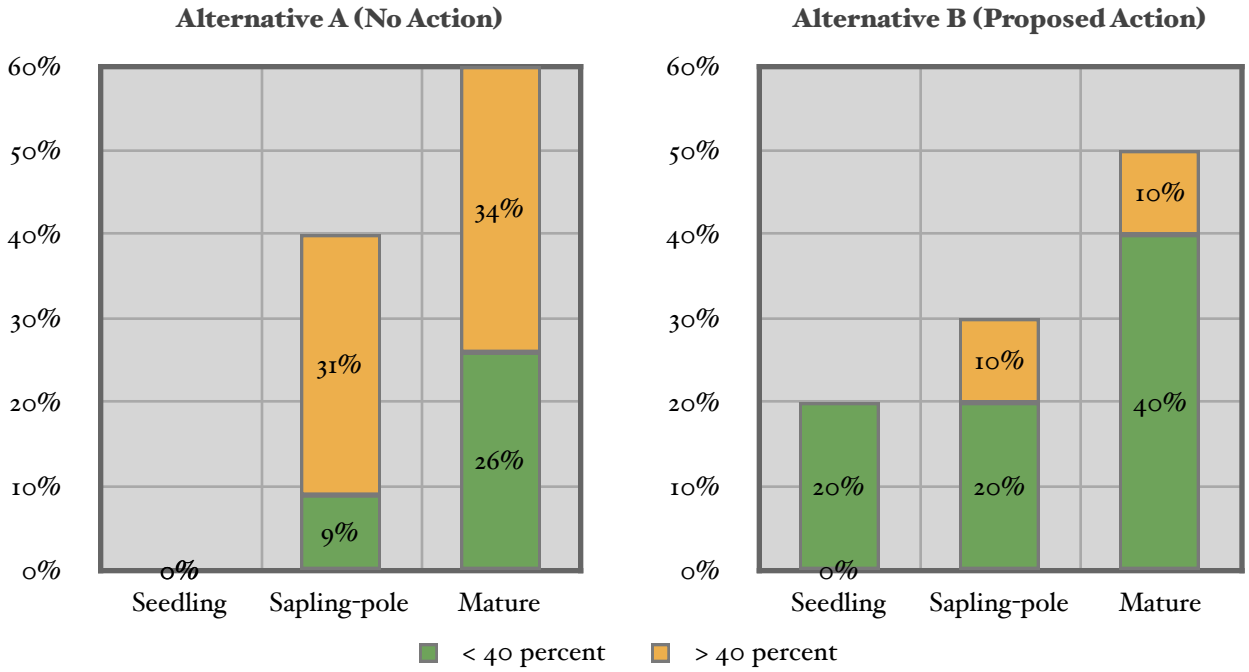

Figure 9. Estimated Structural Stages of Mesic Ponderosa Pine - Alternative B (Proposed Action)[4]

In addition to the change in the overstory vegetation, there would likely be an increase in the diversity of understory plants within many of the treated pine stands due to reduced forest canopy cover and the disturbance caused by tree removal, fuel reduction activities, and prescribed fire. These treatments would open up these stands and result in more sunlight, moisture and nutrients being available for understory plants including grasses, forbs and shrubs. Disturbance created by prescribed fire would help stimulate the growth of some of the less shade tolerant plant species within these stands. Inclusions of aspen and oak within these pine stands would benefit from these treatments.

Mixed Conifer Treatment Areas

The Alternative B (Proposed Action) includes treating up to 7,600 acres of mixed conifer forest within the montane zone. Some areas would be thinned from below leaving a more or less even-aged stands of the larger cohorts. The larger trees would be retained within these thinned areas and the more flammable understory trees would be removed. Residual stand basal areas would range from 60 to 100 square feet per acre. In other areas, patchy openings would be created to encourage regeneration and provide an increase in age class diversity. Areas with evidence of disease or insect infestation (i.e., dwarf mistletoe, white pine blister rust, spruce budworm or bark beetles) would be priority areas for creating these openings. Openings would range in size from a quarter acre up to 40 acres with most being 1 to 10 acres in size. Small clumps of trees may be left scattered across the larger (greater than 1 acre) openings to create structural diversity and provide seed for natural regeneration.

[4] The structural stage estimates are within the mesic Ponderosa pine treatment areas only.

Figure 10 displays a comparison of the effects of the alternatives on mixed conifer structural stages following implementation of vegetation treatments. Currently 87 percent of the mixed conifer treatment areas have a crown cover greater than 40 percent and there are no new stands (seedlings) that have been recently established (Figure 10). Following the implementation of the proposed treatments, up to 20 percent of the mixed conifer area would be opened up and new regeneration encouraged and only about 25 percent of the area would have a crown cover greater than 40 percent. The result of these proposed treatments would be to increase the age and spatial diversity of the mixed conifer stands within the treatment areas.

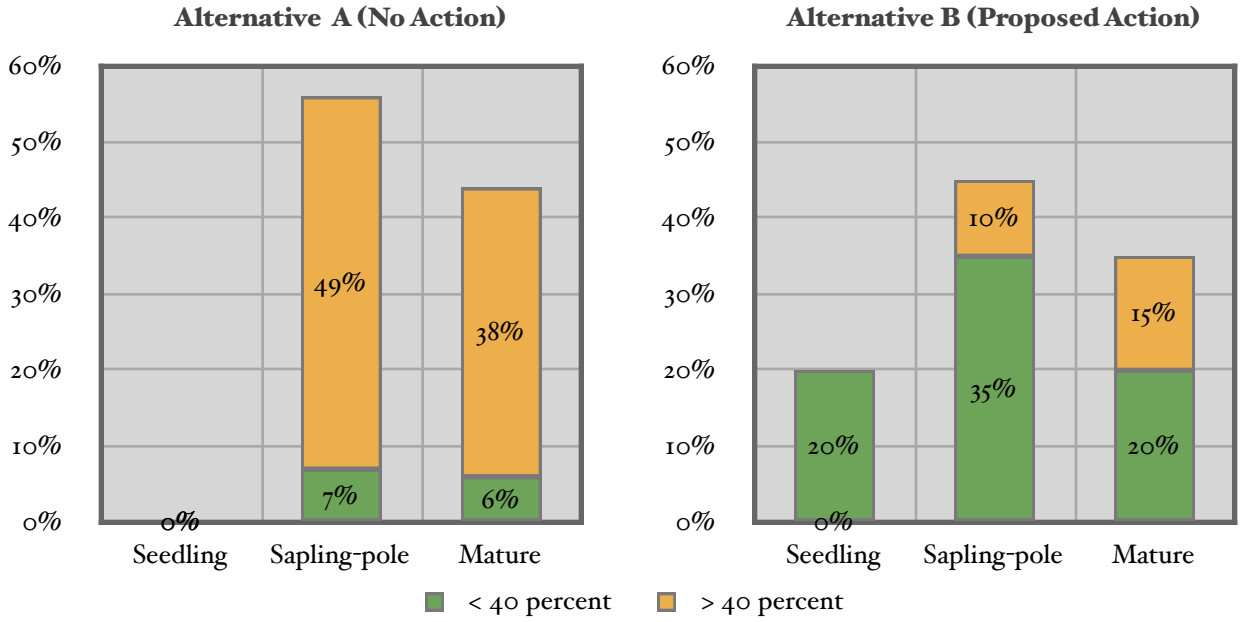

Figure 10. Estimated Structural Stages of Mixed Conifer - Alternative B (Proposed Action)[5]

Fuel Breaks

Up to 2,000 acres of forest would be treated to create fuel breaks under the Alternative B (Proposed Action). These fuel breaks would be located in areas where other vegetation treatments are not prescribed. Some of these treatments would be within the subalpine zone. A fuel break is a gap in forest vegetation or other forest fuels. The main goal of these fuel breaks would be to disrupt the continuity of forest fuels at strategic locations and slow the progress of a wildfire or modify its behavior so that fire suppression efforts are more effective.

Fuel Breaks would be created and maintained at strategic locations throughout the Catamount Project Area. The fuel breaks would likely be located where natural features, such as ridge tops, or manmade features, such as roads, would increase their effectiveness. The activities required to construct a fuel break would vary depending on the existing conditions, but would likely include thinning and prescribed fire. These activities would create and maintain open conditions.

[5] The changes are within the mixed conifer treatment areas only.

The effects of these fuel breaks would be similar to those discussed above for the mixed conifer and ponderosa pine treatments. Like the openings within the ponderosa pine treatments, these fuel breaks would be maintained through periodic prescribed fire or mechanical treatments that would maintain the open forest conditions. These open forest conditions are not typical of what would have developed within the spruce fir communities of the subalpine zone under historic conditions. These forests historically developed under a disturbance regime of infrequent high severity fires (Table 2). These proposed fuel breaks may result in uncharacteristic conditions within these stand types. However, only a small fraction of the subalpine zone would be affected; less than one percent of the subalpine forest would be treated within these fuel breaks.

Forest Insects and Disease

The proposed actions would have an effect on the occurrence and spread of many forest insects and disease in the treated areas including mountain pine beetles. A few years after treatment, trees in the thinned areas would be under less competitive stress and therefore, less susceptible to attack by insects and disease. Insect and disease mortality would likely be limited in extent by the mosaic of structural stages, the increased vigor of the trees due to lower stand densities, and the larger number of openings. Over time as the trees within the thinned areas grow, stand densities would increase and as would average diameters. Given enough time, these stands would once again develop conditions which would increase their risk to bark beetles. Maintaining openings and more open stand conditions through periodic fire would reduce this effect.

There may also be a short period of increased risk of insect attack in the residual trees following treatment. The ground disturbance from the thinning and the heat from the burning can put the trees that remain on-site under stress and more susceptible to bark beetle attack. This effect can last up to two years following treatment.

Alternative B (Proposed Action) - Cumulative Effects

This section presents the potential cumulative effects of the Alternative B (Proposed Action) and past, present and future foreseeable actions in and adjacent to the area on the composition and condition of the forest vegetation of the Catamount Project Area. The cumulative effects analysis covers a period of time starting with settlement of the area by Euro-Americans and ending 10 years into the future. The cumulative effects analysis area includes the Catamount Project Area as well as adjacent private and NFS lands where on-going or foreseeable future vegetation management projects could affect the forest vegetation of the Catamount Project Area.

The existing condition of the vegetation within the Catamount area is largely the result of past and present human activities within the area. Large changes to the forest took place with the settlement of the area in the mid to late 1800s. This period of intensive logging and wildfires was followed by a period of fire suppression and reduced logging (see *Forest Vegetation Alternative A (No Action) - Cumulative Effects* for more details on this earlier period). In more recent years, vegetation treatments have been initiated to reduce the wildfire hazard in the area.

The proposed actions under Alternative B (Proposed Action) in combination with these more recent and future foreseeable vegetation treatments in surrounding areas (see Section 6.2.2 for more details on these

actions) would have a cumulative effect on the forest structure of the Catamount Project Area. Similar actions proposed on areas adjacent to and within the Catamount Project Area (see see *Forest Vegetation Alternative A (No Action) - Cumulative Effects* for more details on these actions) would have a cumulative effect on the structure of the forest vegetation across a larger area.

The treatment areas proposed for the Catamount project represent about 90 percent of the montane forest on National Forest lands within the Catamount Project Area but they account for only 20 percent of the entire Catamount Project Area. These on-going and future treatments in adjacent areas would have a positive cumulative effect on the forest vegetation of the area. These treatments would reduce the risk of a wildfire or beetle infestation developing in adjacent areas that could spread to the forest stands in the Catamount area. These combined actions would reduce the density of forest stands across a larger area and would help to reverse some of the conditions that have resulted from fire suppression, particularly within the montane vegetation of the area.

3.2.3 Special Status Plants Affected Environment

The Regional Forester has identified sensitive species for Region 2, and the Pike and San Isabel National Forests, and Cimarron and Comanche National Grasslands (PSICC) has further refined this list, to include only those species with the potential to occur within its administrative boundaries. The threatened, endangered, and RFSS list for the Pike and San Isabel National Forest was used to identify those species that could occur in the Catamount Project Area. Based on review of the list and research of other records (e.g., Colorado Natural Heritage Program 2009), it was determined that the habitat in the Catamount Project Area could be suitable for five sensitive plant species (Table 4).

Table 4. Federally listed and Regional Forester Sensitive Species (RFSS) plants

Scientific name **Common name**	**Habitat**	**Status**	**Species present?**	**Habitat present?**
Aquilegia chrysantha var. *rydbergii* Rydberg's golden columbine	Montane; ponderosa pine-Douglas-fir; rocky ravines near streams; 7000-8500 feet.	RFSS	Yes	Yes
Botrychium lineare Narrowleaf grapefern	Montane, subalpine; grass/forb meadows, sagebrush, cirqueland; 8500-10500 feet.	RFSS	Yes	Yes
Cypripedium parviflorum Lesser yellow-lady's-slipper	Montane; moist forest, aspen groves; 7500-9000 feet.	RFSS	Yes	Yes
Malaxis brachypoda White adder's-mouth orchid	Foothills, montane; shaded sites, mosses along streams; 7000-8500 feet.	RFSS	1895 record	Yes
Viola selkirkii Selkirk's violet	Montane; cold mountain forests; 7000-9000 feet.	RFSS	No	Yes

Rare plant species habitats within the Catamount Project Area were identified using the state heritage database records and USDA Forest Service vegetation data. Species habitat preferences are based on CNHP data for "S" level precision, i.e. locations mapped with second accuracy (within three arc seconds of latitude and longitude). This approach provides a reasonable level of confidence in determining site conditions where

plants occur. While species may occur on other substrates or cover types, data suggests logical places to prioritize searches for additional occurrences. Should other occurrences be found having conditions different from those predicted, that information will be added to species analysis. These data were used to avoid effects on threatened and endangered plant species in the project design.

The USDI Fish and Wildlife Service (USFWS) has identified two federally listed species as having part of their range on the Pike and San Isabel National Forest. These species are the threatened Penland's alpine fen mustard (*Eutrema penlandii*) and the threatened Diluvium ladies' tresses (*Spiranthes diluvialis*). There are no documented occurrences of, nor habitat for, Penland's alpine fen mustard or diluvium ladies' tresses within the Catamount Project Area, so the proposed project would have no effect on these species. As a result, consultation with US Fish and Wildlife Service is not required.

Seven plant species on the RFSS list have been documented as occurring within the Catamount Project Area, and one additional species has been found nearby and may occur within the Catamount Project Area. Of these species, the habitats of three of them would not be affected by the proposed vegetation treatments. Other species on the RFSS list were not considered because of the Catamount Project Area is outside the known range of the species, there is no appropriate habitat in the project area, or for other reasons (USDA Forest Service 2010b). The effects analysis focused on the five plant species listed in Table 4 and described below.

Rydberg's Golden columbine

Rydberg's Golden columbine (*Aquilegia chrysantha* Gray var. *rydbergii* Munz) is a perennial herb in the buttercup family (Ranunculaceae), flowering from June through July, and fruiting in July (Ladyman 2005). It is likely to be pollinated by hawkmoths (Ladyman 2005).

Golden columbine is found in montane and subalpine mountains, particularly in rocky ravines along streams (Ladyman 2005) in Douglas-fir forests. It frequently occurs on northwest-facing slopes. Tree cover in these areas varies from 20 to 60 percent, and shrub cover ranges from 10 to 80 percent (Ladyman 2005). Extant populations of golden columbine are on the Pikes Peak batholith and the Fountain Formation. Soils are of the Legault-Rock outcrop complex where golden columbine is known. It occurs at elevations from 5,200 to 8,500 feet (Colorado Natural Heritage Program 2009).

This variety of golden columbine is endemic to central Colorado (Ladyman 2005). It has been documented in El Paso County. There are two documented occurrences on the Pikes Peak Ranger District along with at least one additional record nearby (Ladyman 2005). Known sites for golden columbine lie within the Pikes Peak-Rampart Range as defined by McNab, et al. (2007). Sites for golden columbine have been documented in the Fountain Creek-Colorado Springs and Fountain Creek Headwaters fifth level watersheds.

Golden columbine is ranked as G4T1Q by NatureServe (2009). It is tracked by the Colorado Natural Heritage Program and is ranked S1. The distinctiveness of this variety of golden columbine has been questioned in the Flora of North America because Colorado individuals are within the range of variability for the species (Flora of North America Editorial Committee 1997). There are potential threats to some populations from recreational uses along roads and trails, and from invasive species.

Narrowleaf grapefern

Narrowleaf grapefern (*Botrychium lineare* W.H. Wagner), also called narrow-leaved moonwort, is a perennial herb in the adder's-tongue fern family (*Ophioglossaceae*). Spores are produced in June and July (Spackman et al. 1997).

Narrowleaf grapefern is found in deep grass and forb meadows, sagebrush, cirqueland, and potentially other habitats (Beatty et al. 2003). It has been found among the riparian transition vegetation associated with aspen at Pikes Peak. The known sites of narrowleaf grapefern are over the Pikes Peak granite formation. Locally, it occurs in coarse, decomposed granite. The soils of the Pikes Peak narrowleaf grapefern site are aquolls. This species is found at elevations ranging from 7,900 to 11,000 feet (Beatty et al. 2003).

Narrowleaf grapefern ranges from Washington and Montana south to California and Colorado (NatureServe 2009). Local distribution includes two recorded sites El Paso County along the Pikes Peak toll road (Colorado Natural Heritage Program 2009). The known sites for narrowleaf grapefern are within the Pikes Peak-Rampart Range as defined by McNab, et al. (2007). Sites for narrowleaf grapefern are in the Fountain Creek Headwaters watershed.

Narrowleaf grapefern is ranked G2 by NatureServe (2009). It is tracked by the Colorado Natural Heritage Program and is ranked S1. It is rare range-wide with only nine known populations. Narrowleaf grapefern is small and easily over-looked, and may not be present every year. It may be threatened by recreational activities, but more by potential noxious weed encroachment.

Lesser yellow lady's-slipper

Lesser yellow lady's-slipper [*Cypripedium parviflorum* Salisb.] is a perennial herb in the orchid family (Orchidaceae). It flowers from May to July. Fruiting occurs from June to August (Spackman et al. 1997). It inhabits a wide variety of habitats in the lower montane including aspen groves and moist ponderosa pine/Douglas-fir forests, and in subalpine wetlands (Spackman et al. 1997). It is most often on cool, shaded, north-facing slopes (Mergen 2006). This species has been found in association with a variety of geological formations including Pikes Peak batholith. Locations are known on moist sites in Sphinx soils. It occurs at elevations of 7,400 to 8,500 feet (Spackman et al. 1997).

Lesser yellow lady's-slipper ranges across most of North America, south to California, New Mexico, Arkansas, and Georgia (NatureServe 2006). It has been found in El Paso and Teller counties. Eight locations have been documented on the Pikes Peak Ranger District (Colorado Natural Heritage Program 2009). Sites for lesser yellow lady's-slipper are within the Pikes Peak-Rampart Range as defined by McNab, et al. (2007). Sites for this plant have been documented in the Fountain Creek-Colorado Springs Composite, Beaver Creek, and Fountain Creek Headwaters watersheds.

Lesser yellow lady's-slipper is ranked G5 by NatureServe (2009). It is tracked by the Colorado Natural Heritage Program and is ranked S2. It is listed in the CITES Appendix II list, restricting international trade. Threats include over-collecting, timber harvest operations, fire suppression, unregulated recreation, and invasive species. Lesser yellow-lady's-slipper may also respond favorably to light disturbances.

Adder's-mouth

Adder's-mouth [*Malaxis brachypoda* (Gray) Fern is a perennial herb in the orchid family (*Orchidaceae*). It flowers in July and fruits in August (Spackman et al. 1997). Adder's-mouth grows along streams in mosses where it is kept wet by water spray (Spackman et al. 1997). Populations are typically small. The local site for adder's-mouth is over granite of the Pikes Peak batholith. Adder's-mouth records occur in Legault-Rock outcrop complex and Legault family soils. It is found in montane areas at elevations ranging from 7,200 to 8,000 feet (Spackman et al. 1997).

Adder's-mouth ranges across Alaska and Canada south to Minnesota, Illinois, and New Jersey, but there are outlying populations in California and Colorado (NatureServe 2009). There is a historic site on the Pikes Peak Ranger District (Colorado Natural Heritage Program 2009). The documented records of adder's-mouth are within the Pikes Peak-Rampart Range as defined by McNab, et al. (2007). Sites for adder's-mouth have been documented in the Fountain Creek Headwaters watershed.

NatureServe (2009) ranks adder's-mouth as G4. It is tracked by the Colorado Natural Heritage Program and is ranked S1. The local population is disjunct from the major part of the species range.

Selkirk's violet

Selkirk's violet (*Viola selkirkii* Pursh ex Goldie) is a perennial herb in the violet family (*Violaceae*), flowering in May and June. Selkirk's violet grows in montane to subalpine cold mountain (aspen) forests, and in moist woods and thickets. The area where Selkirk's violet has been found is on the Pikes Peak batholith. Soils where Selkirk's violet has been located were wet near the base of alders. Soils are of the Sphinx series. Elevations range from 8,500 to 9,100 feet (Spackman et al. 1997).

Selkirk's violet ranges from British Columbia to Greenland, south to Washington and New Mexico. Distribution in Colorado includes Douglas County, where there are two recorded sites near Devil's Head on the South Platte Ranger District (Colorado Natural Heritage Program 2009). There may be appropriate habitat on the Pikes Peak Ranger District. The recorded sites for Selkirk's violet are within the Pikes Peak-Rampart Range as defined by McNab, et al. (2007).

Selkirk's violet is ranked as G5 by NatureServe (2009). It is tracked by the Colorado Natural Heritage Program and is ranked S1. The Colorado populations of Selkirk's violet are disjunct from the greater range of the species. Habitat may be threatened by unregulated motorized recreation.

3.2.4 Special Status Plants Environmental Consequences

Habitat within the Catamount Project Area for Rydberg's golden columbine, adder's-mouth, and Selkirk's violet occurs near or adjacent to small perennial streams. Forest Plan standards and guidelines and best management practices protect streamside habitats from most adverse impacts. Habitat in the priority treatment areas is generally appropriate for the occurrence of these species, but there are no known individuals present. Yellow lady's-slipper habitat is more widespread in the Catamount Project Area, including moist aspen stands with graminoid-dominated understories. Removal of encroaching conifers and opening of tree canopy would improve conditions for this orchid.

Narrow-leaved grapefern typically occurs in areas of past disturbances, so it is possible that it could appear in many parts of the Catamount Project Area, including priority treatment areas. The proposed activities could provide improved habitat conditions 20 to 50 years following the proposed treatments.

Alternative A (No Action) - Direct and Indirect Effects

Alternative A (No Action) would have no direct effects on the sensitive plants in the Catamount Project Area, because no vegetation treatments would be implemented. However, Alternative A (No Action) could have indirect effects on sensitive plants and habitats over time. Without treatment, conifers would continue to encroach into the open areas where these sensitive plants could occur. This could eventually lead to a decline in habitat quality and loss of individuals as shading changes growing conditions on the site.

Loss of tree canopy cover would continue in some areas due to the effects of insects and disease. This could improve conditions for sensitive plants. Habitat conditions for sensitive plants could decline with increased competition from other plants which also favor open canopied conditions, including several species of noxious weeds. The lack of fire would have a negligible effect on sensitive plants. They could benefit from the nutrient release from fire.

Alternative A (No Action) - Cumulative Effects

Past and current activities have altered plant occurrences and their habitats. These activities have the potential to cumulatively affect plants and include: historic grazing, timber harvest and thinning, fire suppression, prescribed fire, mining, motorized and non-motorized recreational use, road and trail construction, urban development, and noxious weed infestation and treatment.

There would be continued maintenance of existing forest roads and trails in the project area. Other roads would be maintained by the state, county, and by private individuals. Development would continue to occur on private land in the area. Concurrent with these would be the likely increase in traffic on roads in the vicinity. Dispersed recreation use would also continue on NFS lands.

Alternative B (Proposed Action) - Direct and Indirect Effects

Conifer removal from open areas where sensitive plants could occur would increase habitat quality. The few individuals plants that could be damaged by conifer removal would not be harmed.

No temporary roads or skid trails would be put into the area, so no associated soil disturbance or compaction would occur that might affect sensitive plants. Timber operations can cause light to moderate ground disturbances and soil removal. Timber operations would disturb or compact soils in the areas where skid trails and temporary roads are used. It is anticipated that this could account for as much as 15 percent of the landscape in the treatment area. This activity could dislodge herbaceous plants and break stems of shrubs where the actions occur. The amount of disturbance to the soils and plants would vary considerably. Areas at the distant ends of skid trails would receive the least damage, while log landings would receive the most. Plants in the less disturbed sites would be less likely to be severely damaged because the degree of initial disturbance was lower. These plants would be able to recover quickly. Where there are more disturbances, plants that would be naturally recovering would receive additional stress, and some may not survive.

Vegetation treatments may also disturb needle-cast "mulch" where activities occur. In these areas, the potential of noxious weed encroachment is greater. Shade is removed from sites altering habitat conditions for plants.

Any undiscovered populations of sensitive plants would recover along with the remainder of the community, although up to 15 percent of the area would be subjected to potential soil disturbance. Within areas of activity, individuals could be injured or stressed through soil disturbance and compaction from heavy equipment. Over the next 20 to 40 years, site conditions would improve for the grapefern as recovering plant communities mature.

Fuel Break construction would cause some soil compaction, and may require soil disturbance in some situations. This could dislodge herbaceous plants and break stems of shrubs where the actions occur. In these areas, the potential of noxious weed encroachment is greater. Fuels management by mechanical or hand treatment can indirectly impact sensitive plants by causing changes in vegetation composition and successional pathways of that vegetation, changing local hydrologic patterns, changing the fire regime or by changing the soil characteristics of the habitat.

Prescribed fire may cause some light ground disturbance, and some incidental soil compaction. Above-ground parts of plants, both herbaceous and woody, would be consumed, but root material would rarely be damaged enough to prevent their regrowth. The direct effect of fire is the potential scorching or mortality of individuals or populations from fire or heat. However, due to the timing of the prescribed fires, no plants would be actively growing at the time.

Fire can lead to changes in forage condition, and this can cause changes in the foraging behavior of livestock and wildlife within the area. Indirect effects can also occur from noxious weed invasion or from impacts to pollinators or mycorrhizae associated with sensitive plant species.

Fire may be detrimental to sensitive plants because weed infestation following fire can directly compete with RFSS for light, water, and nutrients. Conversely, fire may be beneficial to these species because growth of mycorrhizal associates may be stimulated by nutrient release after fire. Any undiscovered populations of the sensitive plants plants having appropriate habitat in the area would recover along with the remainder of the community. Because of nutrient release following the fire, their populations may expand.

Noxious weed invasion potentially poses a negative impact to all plant habitats. These potential effects result from removal of vegetation and opening up the area to additional light. Weed infestation following a burn has the potential to extirpate populations of uncommon plants. Noxious weeds, once established, could indirectly impact sensitive plant species through allelopathy (the production and release of plant compounds that inhibit the growth of other plants), changing the fire regime, or direct competition for nutrients, light, or water. Subsequent weed control efforts could also negatively impact sensitive plants.

Burning hand-piled slash also has the potential to eliminate the herbaceous layer below the pile for years after the pile has burned since high intensity fires could sterilize the soil. Mechanical treatment and hand treatment may directly impact RFSS by trampling and crushing plants, displacing soil and plants, or smothering plants with slash, chips, or soil.

Alternative B (Proposed Action) - Cumulative Effects

Wildfire, insect damage, windthrow, and timber harvest have led to a more open canopy in some areas with additional light reaching the forest floor, soil disturbance and compaction, and noxious weed invasion. Changes in forest composition, structure and fire frequency have also taken place. Fire suppression has led to increased fuel loading and canopy closure. Denser stands are now more homogenous and with higher humidity (altering stand characteristics) and greater soil moisture. Both of these have changed habitat conditions for plants and may have affected their local distribution and populations.

During the mining boom in Colorado, many backcountry locations contained railroads and established towns with year-round human populations. Activities associated with mining include road and railroad development, timber harvest, weed invasion, and revegetation efforts.

Urban development is expected to continue in the vicinity of the Analysis Area on private lands. This may fragment habitat, isolate species populations, and increase the risk of weed invasion and the incidence of catastrophic wildfire.

Recreation is a frequent use of the Forest within the Analysis Area. Motorized touring is prevalent as are hunting, camping, hiking, and horseback riding during certain times of the year. Roads in particular increase soil erosion, increase sedimentation, and facilitate the spread of noxious weeds. Motorized and non-motorized recreational use has led to the development of non-system roads and trails, development of dispersed campsites, erosion, and ground disturbance.

Warmer and drier climate has led to higher levels of heat and water stress. Trees undergoing physiological stress are more susceptible to insects and diseases, and experience higher rates of mortality. This may be associated with decreased decomposer activity.

The proposed timber operations and prescribed fire treatments in the Catamount Project Area total about 21,100 acres. The proposed maximum treatment area of 21,100 acres accounts for about seven percent of the Pikes Peak Ranger District. It also accounts for less than three percent of the fifth level watersheds. The design features listed in 2.3.4 Sensitive Plants, Range Resources, and Noxious Weeds would minimize impacts to sensitive plants. No adverse cumulative effects are expected.

3.3 Fire-Fuels/Air Quality

This section is divided into two; wildfire hazard and fuels, and air quality. The discussion is summarized from the Catamount Forest Health & Hazardous Fuels Reduction Project Fire-Fuels Specialist Report (JW Associates 2010b) and the Catamount Forest Health & Hazardous Fuels Reduction Project Air Quality Specialist Report (JW Associates 2010c).

3.3.1 Fire-Fuels Affected Environment

Historical Conditions

Fire has historically played a significant role in shaping the fire-adapted ecosystems of the interior western states. At the turn of the 20th Century, selective logging, livestock grazing, and fire prevention and suppression activities began to change the composition, structure, and function of these fire-adaptive ecosystems. As suppression actions increased, natural recurrent underburning was eliminated. The result has been a transformation of forest stands moving from open park-like areas into denser, overgrown stands. Extended human development, fire suppression, prolonged fire exclusion, and climate changes have created over-accumulated vegetative conditions in these fire-adapted ecosystems that predispose areas to severe wildfire threats. Historical conditions for the Catamount Project Area can best be described as areas with wildfires spatially widespread, having significant stand-replacing events. This resulted in a variety of vegetative structures on the landscape (USDA Forest Service 2002a).

The historical ponderosa pine forest was likely quite open with fewer trees, greater age diversity between stands, and larger openings than the area displays today. Under historical conditions, studies have indicated that fire typically served to maintain open mature stands, as well as to maintain some areas as openings. Brown et al. 1999 and Kaufmann et al. 2000 provide evidence that frequent, mixed severity fires characterized the ponderosa pine stands from 1000 to 1870. Although there were areas of severe fires, these areas were relatively small in extent and critical in creating openings of 20 to 40 acres that were maintained by the dry site conditions until regeneration occurred. The open forest was protected from extensive fires because of the distance between tree crowns and the openings (USDA Forest Service 2002a). Smaller fires that did not move into the crowns would have limited the growth of Douglas-fir, which does not tolerate fire well, to sites where fires were infrequent, particularly wetter, north-facing slopes. The smaller fires would also have kept the forest more open by limiting the growth of understory trees.

Frequency and fire patterns created a varied burn pattern that in turn created a sustained vegetative pattern across the landscape. This mosaic pattern would be maintained as the patch-like variations of age classes, densities, and openings caused fires to skip around rather than kill all trees over large areas. Some stands would have had a multitude of age classes from seedlings to trees more than 400 years old. There were probably few snags (standing dead trees) and cavities in live trees. A few stands would have been nearly even-aged due to stand-replacing fires followed by even-aged regeneration.

One key to the sustainability of the historic forest was its open condition. The open forest would have been somewhat protected against extensive fires because of the distance between tree crowns and larger openings.

Openings may have covered 20 to 25 percent of the area, and some of these openings may have persisted for decades due to climatic and seed source limitations. Regeneration would have begun immediately on other burned sites. Therefore, post-fire patterns of regrowth would have resulted in variations both in space and time, contributing to the complexity of the landscape.

In the subalpine forest, fire would also have been the major disturbance factor; however, windthrow (trees felled or broken off by wind) and insect outbreaks may also have contributed to disturbance patterns. Fires in the subalpine zone appear to have been less frequent and more catastrophic. A typical fire pattern would be a stand-replacing crown fire that caused extensive mortality followed by a long (up to 300 or more years) fire-free period. This would result in the establishment of even aged lodgepole pine or aspen stands which are able to quickly establish after intense burns. Other areas would have been colonized by a mixture of lodgepole pine, aspen and Engelmann spruce while some of the more exposed sites may have been re-vegetated by limber pine. Over time, Engelmann spruce and subalpine fir would become established as an understory and eventual climax species on most of these sites.

Past Vegetation Management

Early records indicate the Catamount Project Area was heavily logged during the late 1800s and into the early 1900s. Designated a National Forest in 1907, extensive logging activities, primarily consisted of salvage operations and illegal harvesting. USDA Forest Service policy at the time allowed the harvesting of dead trees but those operations raised suspicions, some human caused fires were intentionally set. Substantial portions of the ponderosa pine and Douglas-fir overstory was removed during this era and in combination with large-scale wildfires, resulted in very little old growth stands within the montane forests of the Catamount Project Area today. Large-scale fires were caused by lightning, human carelessness, and as a cover-up for illegal logging operations. Fire suppression has occurred on the forest since its establishment as a Forest Reserve in 1892. However, several decades were needed to develop the infrastructure and personnel to effectively suppress fires. These factors have all contributed to the development of a mostly even aged overstory dominating the montane and sub-alpine forest types within the Catamount Project Area (USDA Forest Service 2008).

Wildland Urban Interface (WUI)

The National Fire Plan, written in 2001, outlines a comprehensive approach to the management of wildland fire, hazardous fuels, and ecosystem restoration on Federal, State, and private lands. Goals of the National Fire Plan are to prevent loss of life, reduce firefighter injuries, and lessen damage to communities and the environment from severe, unplanned, and unwanted fires. Two of the main priorities of the National Fire Plan include targeting funding towards communities that have a Community Wildfire Protection Plan (CWPP) in place and WUI areas with the potential for reduction in high risk (USDA Forest Service 2001a).

In addition, a list of At Risk Communities was published in the Federal Register (August 2001). This list outlines the WUI communities in the vicinity of Federal lands that are at high risk from wildfire. The list was developed so land managers could identify priority areas that would benefit from fuels reduction activity. The At Risk Communities located in proximity to the Catamount Project Area include: Cascade, Chipita Park, Colorado Springs, Crystola, Green Mountain Falls, Manitou Springs, and Woodland Park (Figure 11).

The WUI is generally described as the zone where structures and other human developments meet and/or intermingle with undeveloped wildland or vegetative fuels (Preparing a Community Wildfire Protection Plan, A Handbook for Wildland Urban Interface Communities March 2004). There are two CWPPs, one for Colorado Springs and the second for Teller County. The CWPP states that within ½ mile of all inhabited structures hazardous fuels should be reduced to the point where a high intensity crown fire would not be supported.

In the Catamount Project Area approximately 33,608 acres are defined as Priority Area treatment acreages. Within the Priority Area there are approximately 6,560 acres designated as WUI and approximately 27,048 acres are Non-WUI areas.

Community Wildfire Protection Plans (CWPP)

The HFRA of 2003 emphasizes the role of community planning and offers a variety of benefits to communities with a Community Wildfire Protection Plan (CWPP) including matching federal grants for fuel reduction projects. A CWPP requires approval by local governments, fire authorities, and the state forest management agencies in consultation with federal land management agencies.

The communities of Cascade, Chipita Park, and Green Mountain Falls worked together along with local and federal agencies to develop the Ute Pass CWPP, which lies almost entirely within the Catamount Project Area. The Ute Pass CWPP is a new entity with a five-year implementation and monitoring plan with the primary goals of fuels reduction, reducing structural ignitability, and improving emergency preparedness. Teller County, part of which lies in the Catamount Project Area, has also developed a comprehensive CWPP.

Woodland Park has been selected as a demonstration community by the Front Range Roundtable to improve forest health and develop local biomass opportunities. The community will receive grant funding and work with state, federal and local agencies to develop a comprehensive plan to treat acres in need of attention, to utilize harvested material and establish a local capacity for processing. Their mitigation strategy is to create fuel breaks or buffer zones in the high value, high-risk areas. The forested areas surrounding Woodland Park have been identified as a unique and serious fire hazard to the residents of Teller County, and are slated for priority fuels treatment within the Teller County CWPP.

Fire History/Fire Hazard

The Catamount Project Area fire history contains 160 fires that were recorded between 1974 and 2006, or approximately 5 per year. The majority of these fires (120) were less than ¼ acre, with 37 more between ¼ and 10 acres. Only 3 fires greater than 10 acres were recorded. The total acreage burned was less than 145 acres. Of these 160 fires, the majority were human caused. The size of each fire is a result of fire behavior as well as response time and suppression efforts.

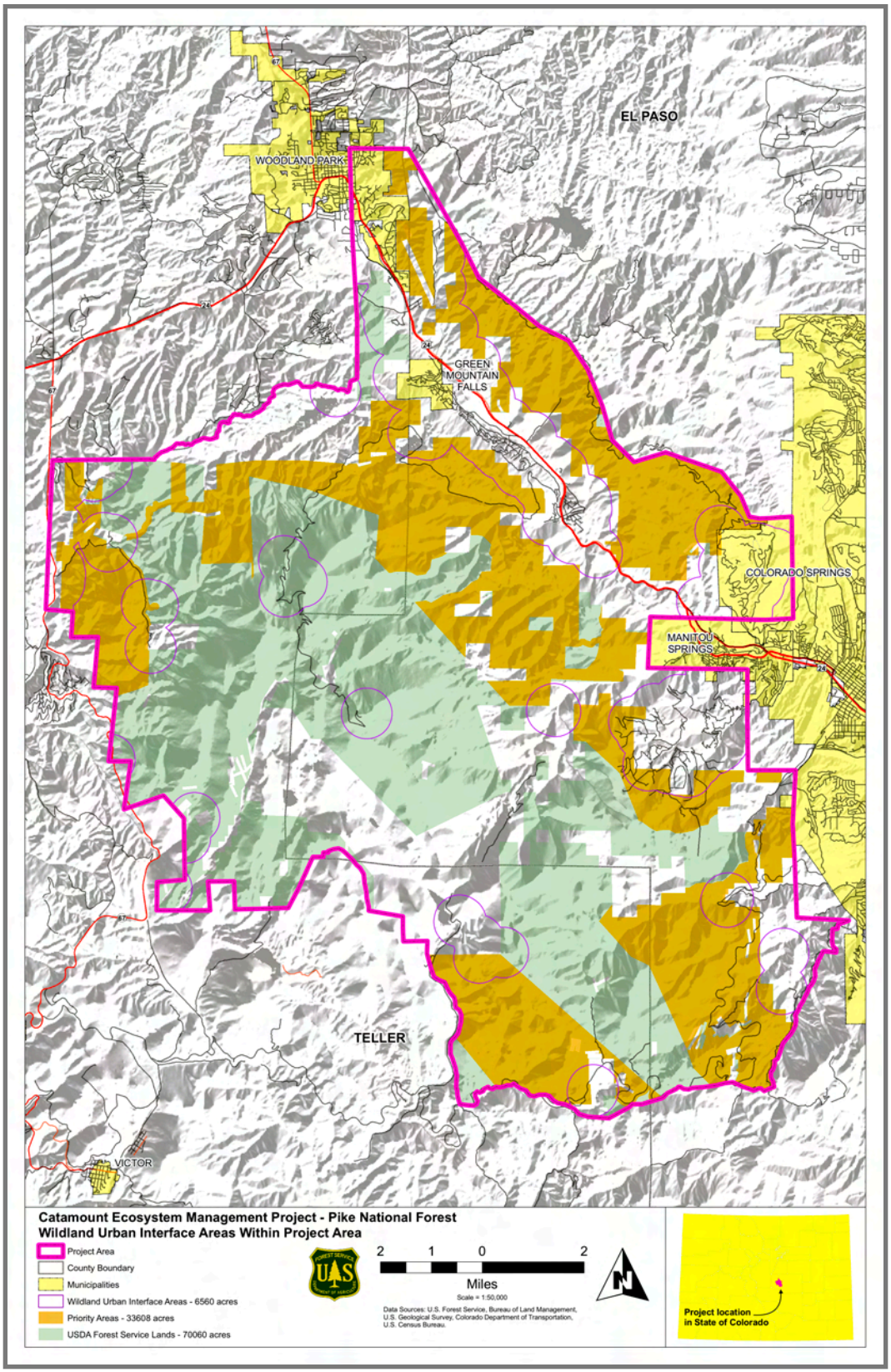

Figure 11. Catamount Project Area Wildland Urban Interface (WUI) Areas

In 2008 there were four large fires that occurred adjacent to the forest boundary, the largest being the TA25 fire that burned approximately 12,500 acres. The other three fires were greater than 500 acres in size. In 2009 there were three fires ranging from 10 to 30 acres that occurred adjacent to the Forest. These fires are indicative of the potential large catastrophic fires that have the potential to occur in the Catamount Project Area. The Incline Fire that occurred in September of 2007 demonstrates the impact of fire upon humans. This 40-acre fire threatened CSU utilities, caused the evacuation of approximately 1,000 people, and closed the Cog Railroad for an extended length of time (Zanotto 2010). The fire hazard for the Catamount Project Area was calculated by incorporating the risk of ignition, values at risk and fire hazard (USDA Forest Service 2008) and is displayed on Figure 12.

3.3.2 Fire-Fuels Environmental Consequences

The ratings for fire hazard increase relative to the amount and continuity of surface and canopy fuels. As the amount of fuel on a given landscape increases, fuel profiles become more horizontally and vertically continuous and the intensity of a wildfire in that landscape would be expected to increase correspondingly. Stands with low crowning index and torching index are the least susceptible to crown-fire initiation and spread.

Changes in structural stage is the criterion used in this analysis for assessing changes in the fire hazard of stands in the Catamount Project Area. This analysis assigns fire hazard ratings to the various structural stages and uses changes in those ratings to compare Alternative A (No Acton) to changes resulting from the implementation of treatment activities shown in Alternative B (Proposed Action). The direct and indirect effects of the proposed fuel treatments include lands located not only in the Priority Areas for treatment but also lands within and adjacent to the Catamount Project Area. Cumulative effects are also analyzed for similar lands.

Vegetation management and mechanical treatments are effective in reducing the threat of crown fire (Graham et al. 1999). Treatments that reduce density and change the composition of stands would reduce the probability of crown fire, decrease severity of impacts, reduce the threat to high-value areas, and enhance fire-suppression effectiveness and safety (Pollet and Omi 2002). In forested stands that have developed without regular disturbance, combinations of mechanical harvest/thinning and prescribed fire are the most effective technique for altering the fuels matrix (Graham et al. 2004).

A mix of treatments in and around At Risk Communities and other WUI areas can be very effective against crown fire and spotting from firebrands if they are targeted toward the factors influencing the threat (i.e. structure of vegetation, fuels loadings, topographic influences, ingress and egress, and predominate winds). This improves the fire hazard rating within stands that are predominately hardwoods. Hardwoods have been found to create excellent fuel breaks, as they do not support sustained crown fires (USDA Forest Service 2001a).

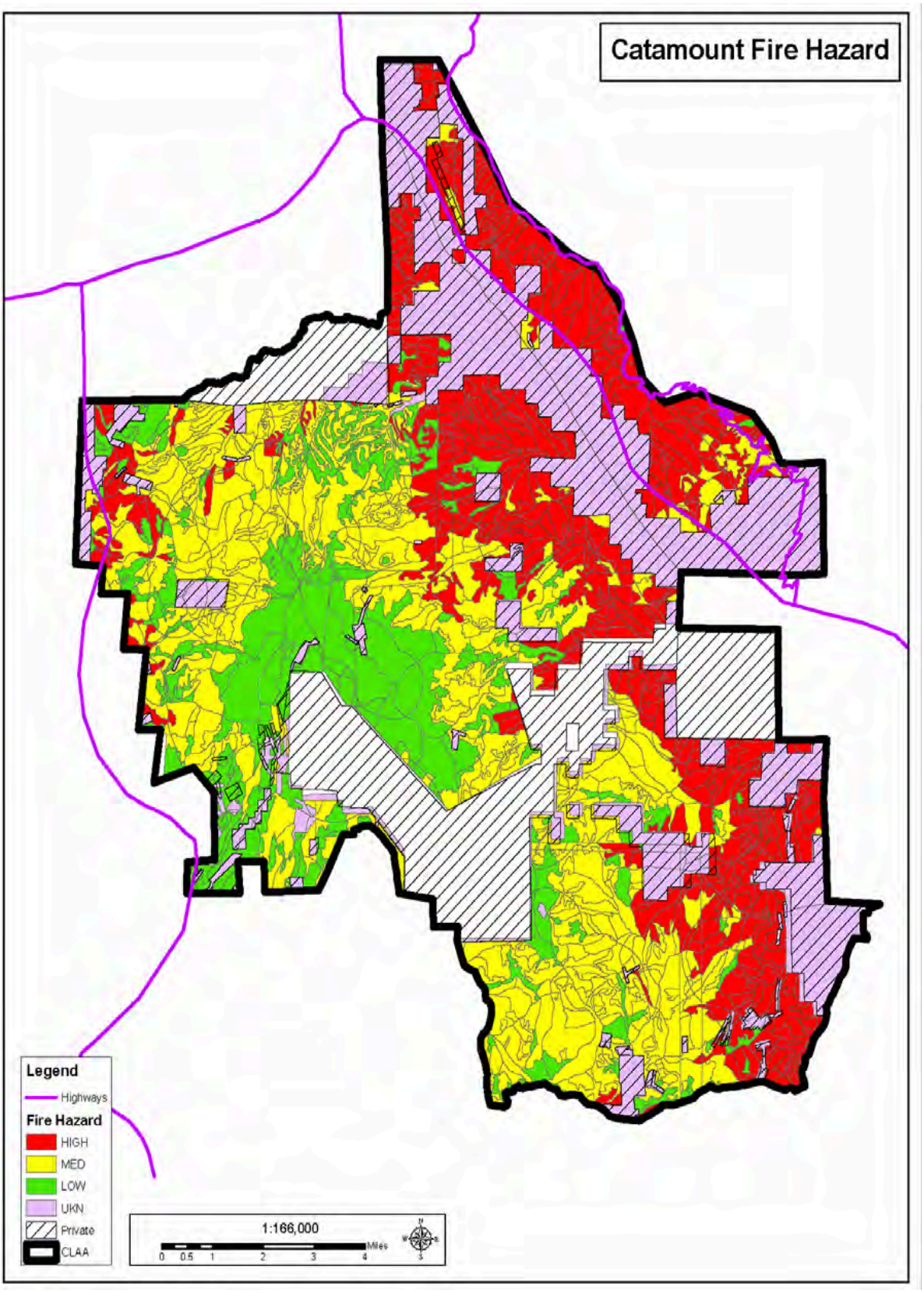

Figure 12. Fire Hazard in the Catamount Project Area

Alternative A (No Action) - Direct and Indirect Effects

No direct effects would occur because no actions would be taken under Alternative A (No Action). Indirect effects on forest stand structures and subsequently on wildfire behavior would likely occur if no treatments are planned or implemented in the Catamount Project Area. With no treatment, vegetative material would add volume and structure to the fuel matrix. Continued needle and timber litter deposition would add to the surface fuel loading. Understory vegetation would continue to grow vertically which would essentially lower the canopy base height and overstory crowns would continue to grow together increasing the canopy bulk density of the stands thereby making them susceptible to active crown fire. Fire behavior, especially how it relates to surface to crown fire transition in ponderosa pine stands, would have the potential to become more intense. Crown fires may be more easily sustained once initiated.

Hardwood stands currently serve as natural fuel breaks. Growth of conifers in hardwood stands could eventually convert these natural fuel breaks into areas which are unable to alter the direction and rate of fire spread. In some ponderosa pine stands, lack of management and natural disturbances could allow shade-tolerant species such as white spruce to become established. Over time, this encroachment would eventually convert the stand from a fire-tolerant species to a fire-intolerant species with low growing crowns that are easily accessed by surface fires making these stands more susceptible to stand replacing fire.

As the fire hazard in the Catamount Project Area continues to move toward high and very high, and the development of private property within the Catamount Project Area continues, the risk of property damage, and public and firefighter exposure to wildfire would increase. Firefighters would be required to take more aggressive actions such as utilizing mechanized equipment and more personnel to keep fires small resulting in increased suppression costs and more negative ecological effects from suppression actions. The probability of a fire escaping initial containment actions would increase, fires would become larger, more mechanized equipment, more personnel, and larger burnout operations would be required to control wildfires. Suppression costs would increase; negative ecological effects would increase, and firefighter exposure to erratic fire behavior would be increased.

Alternative A (No Action) - Cumulative Effects

Alternative A (No Action) would not address National, Agency, Forest, or local direction for reducing wildland fuel accumulations in the short-term. The cumulative effects on the changes in forest vegetation are described in *Forest Vegetation Alternative A (No Action) - Cumulative Effects.* The cumulative effects from not undertaking actions to reduce wildland fuel accumulations would result in increasing fire hazard and risk as fuel accumulations build above current levels. In the long-term adverse effects to people and the environment from wildfire and suppression activities would increase.

Alternative B (Proposed Action) - Direct and Indirect Effects

Gambel Oak Treatment Areas

Under Alternative B (Proposed Action) up to 1,500 acres of Gambel oak shrublands would be treated. The objectives of the proposed treatments would be to create fuel breaks and improve the vigor and palatability of plants used as forage for wildlife species. Mastication and hand thinning would be used to thin or remove

Gambel oak and stimulate grass and other ground cover. These treatment areas would function as fuel breaks. The proposed Gambel oak treatments would promote suckering. Therefore, the treatment area would need periodic maintenance to retain their effectiveness as fuel breaks.

Aspen Treatment Areas

Under Alternative B (Proposed Action) up to 2,200 acres of aspen would be treated. The treated stands would be primarily within the montane vegetation zone where aspen may eventually be replaced by conifers in the absence of fire or other disturbance. Aspen stands affect by SAD are also a priority for treatment. The objective of the proposed treatments within the aspen stands would be to restore the health and vigor of the existing aspen stands and expansion of their current extent. The treatment areas in aspen would function as effective fuel breaks.

Ponderosa Pine Treatment Areas

Currently 37 percent of the dry site forests have crown covers greater than 40 percent and there are few openings or seedling dominated stands within these areas (Figure 8). Following the implementation of the proposed treatments up to 30 percent of the area would be maintained in openings and only about ten percent of the area would have crown covers greater than 40 percent (Figure 8).

Changes in the dry ponderosa pine structural stages under Alternative B (Proposed Action) would reduce the fire hazard of the Catamount Project Area. These changes include a reduction in the highest fire hazard category (greater than 40 percent crown cover mature stage) of 18 percent (Figure 13). There would also be a reduction in the greater than 40 percent crown cover sapling-pole stage by 9 percent (Figure 13). The seedling category would increase by 30 percent. The effects of these proposed treatments would be to move stand conditions toward the open forest conditions representative of historical conditions identified by Kaufman and others (2006). The forest would be moved toward the objective of creating and maintaining more open forest conditions that historically characterized these dry site forests. The resulting forest would be more resilient to surface fires and have a lower risk of sustaining a crown fire. Areas that are currently Condition Classes III and II would be moved toward the historical Condition Class I[6].

The mesic ponderosa pine areas are currently dominated by closed canopied stands with 65 percent of the area having crown covers of greater than 40 percent (Figure 9). Like the drier pine sites, there are few openings within the mesic ponderosa pine areas. Following the vegetation treatments proposed under Alternative B (Proposed Action), about 20 percent of the mesic pine treatment areas would be in openings and 80 percent of the area would have crown covers of 25 to 30 percent (Figure 9).

[6] Condition classes are a measure of the degree of departure from historical fire regimes that result from alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. Condition Class I is low departure. Condition Class III is high departure. They are defined in USDA Forest Service 2001.

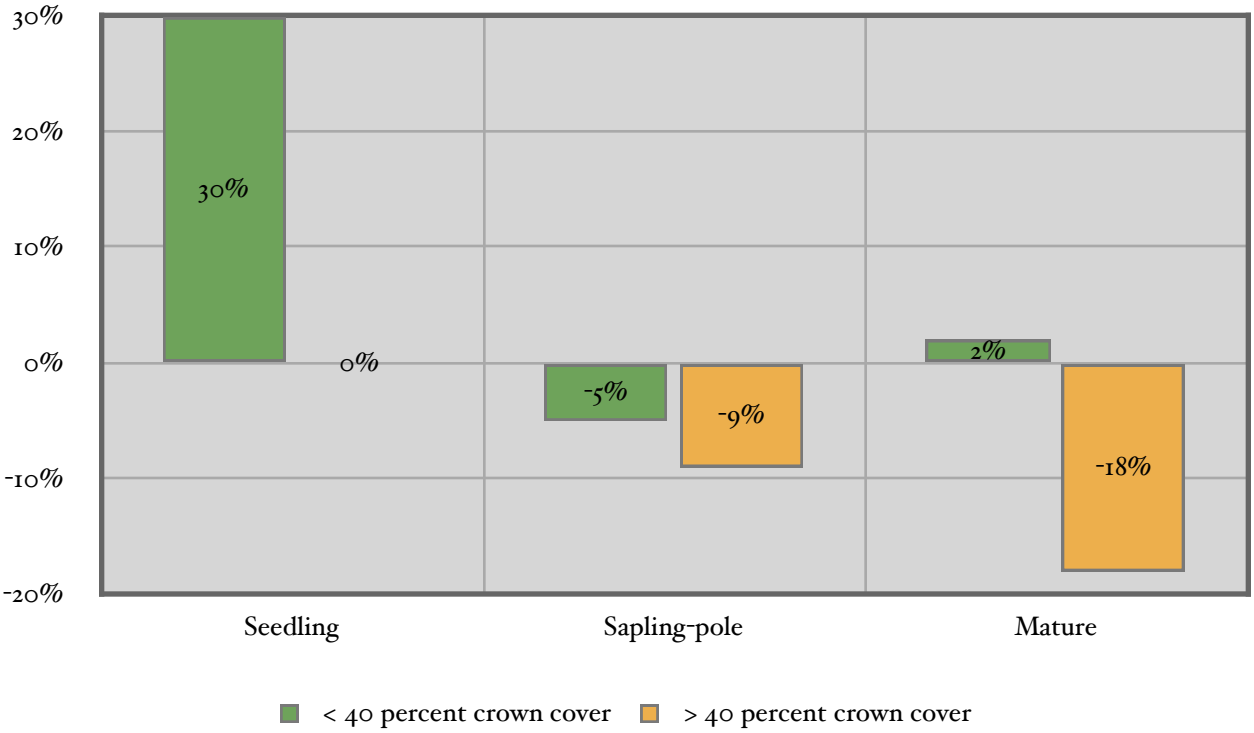

Figure 13. Percentage Changes in Structural Stages of Dry Ponderosa Pine Associated with Alternative B (Proposed Action)

Changes in the mesic ponderosa pine structural stages under Alternative B (Proposed Action) would reduce the fire hazard of the Catamount Project Area. These changes include a reduction in the highest fire hazard category (greater than 40 percent crown cover mature stage) of 24 percent (Figure 14). There would also be a reduction in the greater than 40 percent crown cover sapling-pole stage by 21 percent (Figure 14). The seedling category would increase by 20 percent. The ladder fuels component would be removed in these stands thereby lowering the risk of sustaining a crown fire, a result of fire moving from a surface fire into the crown canopy. Under Alternative B (Proposed Action) the objective to create more open forest conditions and a greater range of residual stand densities would be achieved. Areas that are currently Condition Classes III and II would be moved toward the historical Condition Class I.

The ponderosa pine treatment areas would be converted to open mature and sapling-pole forest interspersed with openings. The ponderosa pine forests in these areas would begin to resemble the historical conditions that were maintained by the natural disturbance regimes that existed prior to European settlement. The open stand conditions in thinned areas would encourage the development of understory grasses and shrubs. Overtime, this type of understory, combined with the thinned conditions, would create light ground fuels and a stand structure that could carry a low intensity fire with only occasional torching of individual crowns. If ground fires are allowed to burn through these stands occasionally, the more open environment could be maintained by discouraging the establishment of understory trees. However, if fire is suppressed and no other means is used to maintain open conditions, stands would eventually grow back to the denser conditions that exist today.

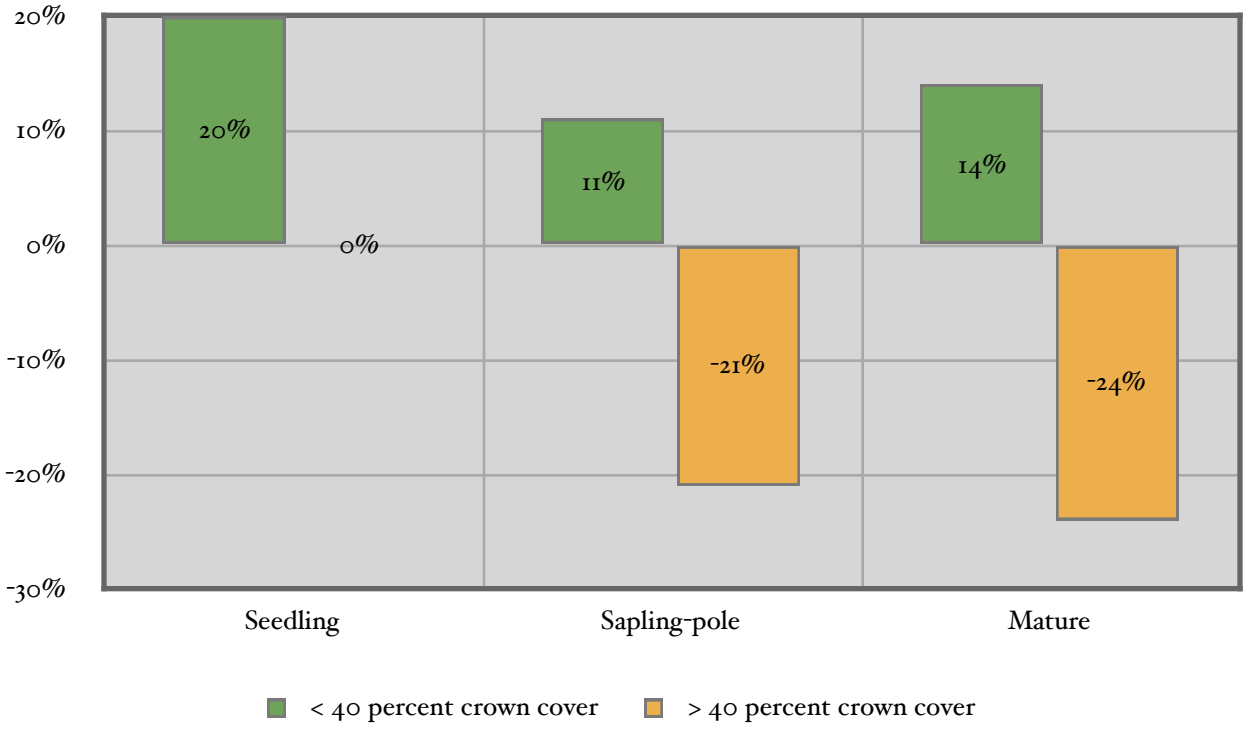

Figure 14. Percentage Changes in Structural Stages of Mesic Ponderosa Pine Associated with Alternative B (Proposed Action)

In addition to the change in the overstory vegetation, there would likely be an increase in the diversity of understory plants within many of the treated pine stands due to reduced forest canopy cover and disturbance caused by tree removal, fuel reduction activities, and prescribed fire (JW Associates 2010a). These treatments would open up these stands and result in more sunlight, moisture and nutrients being available for understory plants including grasses, forbs and shrubs. Disturbance created by prescribed fire would help stimulate the growth of some of the less shade tolerant plant species within these stands. Inclusions of aspen and oak within these pine stands would benefit from these treatments.

Mixed Conifer Treatment Areas

Mixed conifer areas most likely were developed under a mixed severity fire regime (Crane 1982) that would have resulted in a greater variety of stand structures and ages. Currently stand density has increased due to the lack of natural disturbances and suppression efforts. Understory trees, that provide ladder fuels, are present across a larger proportion of the mixed conifer forest than would have existed historically, leaving the area at high risk for large crown fires. Currently 87 percent of the mixed conifer treatment areas have crown covers greater than 40 percent and there are no new stands (seedlings) that have been recently established (Figure 10).

Changes in the mixed conifer structural stages under Alternative B (Proposed Action) would reduce the fire hazard of the Catamount Project Area. These changes include a reduction in the highest fire hazard category (greater than 40 percent crown cover mature stage) of 23 percent (Figure 15). There would also be a reduction in the greater than 40 percent crown cover sapling-pole stage by 39 percent (Figure 15). The seedling category would increase by 20 percent. The result of these proposed treatments would be to increase the age and spatial

diversity of the mixed conifer stands within the treatment areas. The effects of treatment would be to decrease the potential for crown fire generation. Simultaneously there would be an increase in age and spatial diversity of stand structures across the landscape. Following treatment, those stands currently in Condition Class III and II would move toward the historical Condition Class I.

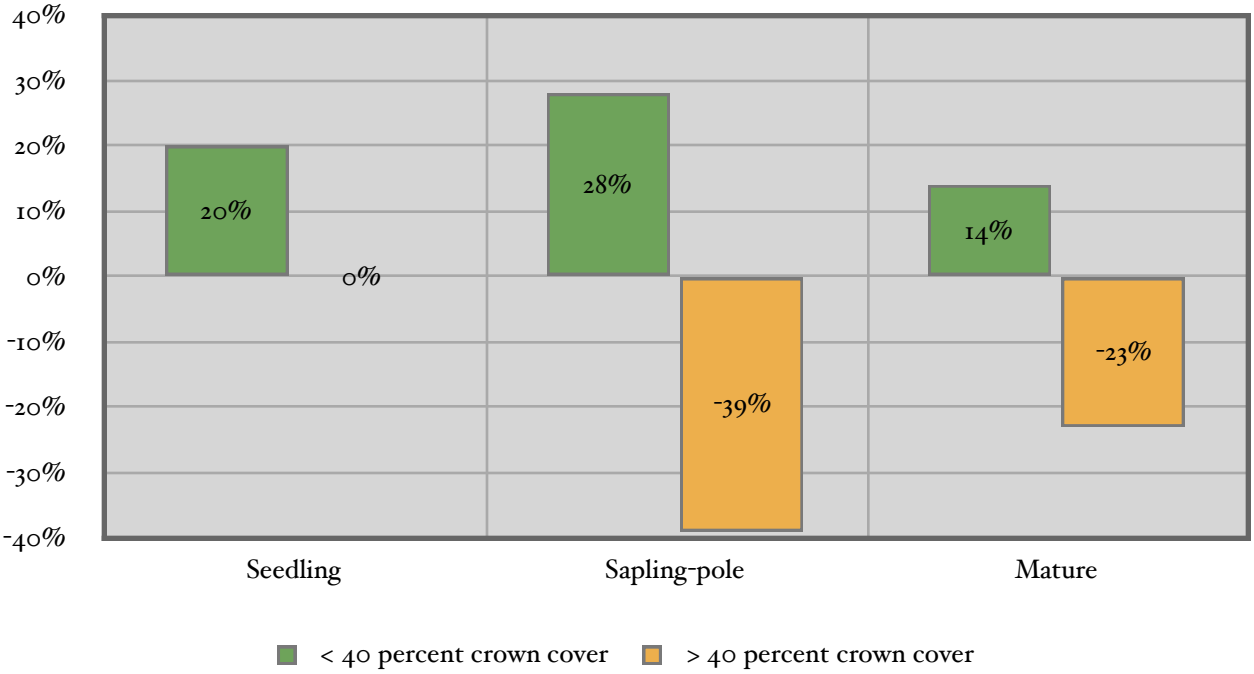

Figure 15. Percentage Changes in Structural Stages of Mixed Conifer Associated with Alternative B (Proposed Action)

Fuel Breaks

Up to 2,000 acres of forest would be treated to create fuel breaks under the Alternative B (Proposed Action). These fuel breaks would be located in areas where other vegetation treatments are not prescribed. Some of these treatments would be within the subalpine zone. Fuel Breaks are defined as a natural or manmade change in fuel characteristics, which affects fire behavior so that fires burning into them can be more readily controlled (National Wildfire Coordination Group 2008). The main goal of these fuel breaks would be to disrupt the continuity of forest fuels at strategic locations and slow the progress of a wildfire or modify its behavior so that fire suppression efforts are more effective.

The effects of these fuel breaks would be similar to those discussed above for the mixed conifer and ponderosa pine treatments. Like the openings within the ponderosa pine treatments, these fuel breaks would be maintained through periodic prescribed fire or mechanical treatments that would maintain the open forest conditions. These open forest conditions are not typical of what would have developed within the spruce fir communities of the subalpine zone under historic conditions. These proposed fuel breaks may result in uncharacteristic conditions within these stand types. However, only a small fraction of the subalpine zone would be affected, less than one percent of the subalpine forest would be treated within these fuel breaks.

Alternative B (Proposed Action) - Cumulative Effects

The effects of vegetation treatments under Alternative B (Proposed Action), combined with the effects of other actions that have occurred in the Catamount Project Area, would create cumulative impacts on fire hazard within the Catamount Project Area. The cumulative effects on the changes in forest vegetation are described in *Forest Vegetation Alternative A (No Action) - Cumulative Effects.* The proposed treatments under this alternative would alter overstory canopies, understories, and surface and ladder fuels that contribute to a substantial lowering of the fire hazard ratings. The reduction of fire hazard would contribute to less erratic fire behavior resulting in more effective fire suppression actions, increased firefighter safety, and less damage to natural resources. In addition, Alternative B (Proposed Action) would begin moving the vegetative conditions away from current Condition Classes II and III toward the historical vegetative conditions (Condition Class I). The proposed actions under Alternative B (Proposed Action) in combination with more recent and future foreseeable vegetation treatments in surrounding areas would have a cumulative effect by reducing the fire hazard of the Catamount Project Area.

3.3.3 Air Quality Affected Environment

Maintaining currently high air quality standards is important to the Catamount Project Area. Wildfires cause temporary and unscheduled increases in pollutants, particularly emissions of particulate matter, measured as PM 10 (particles less than 10 microns in size). Additionally there are potential impacts that would result from any proposed management activities in the Catamount Project Area. The proposed management activities are analyzed to evaluate air quality impacts because of their potential effect upon all populations, especially the young and elderly, and those with respiratory health problems. The fundamental impact from the proposed management activities would be short-term degradation caused by smoke emissions from the prescribed burn program. To a much lesser extent, impacts from equipment use produce dust and vehicle emissions but are much smaller in comparison to the magnitude of emissions produced from prescribed fire projects.

The Catamount Project Area is located on the Pikes Peak Ranger District of the Pike and San Isabel National Forest in Colorado. It lies within in Douglas, Teller and El Paso Counties, and is approximately 8 miles west of the Colorado Springs metropolitan area. The Catamount Project Area is considered to have "very good" air quality. Although in close proximity to Colorado Springs, an urban area, the airshed has remained within attainment of air quality standards. Human activities such as motorized recreation within this area are limited and do not produce a high impact to the air quality of the Catamount Project Area.

Attainment of air quality standards is based on seven recognized pollutants that are measured and judged against the standards. The seven pollutants are: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), lead, sulfur dioxide, PM 10 and PM 2.5. Of these pollutants, there are five that are of primary concern in the Catamount Project Area. These are the particulates PM10 and PM 2.5, O_3, CO, and NO_2. Wildfires, prescribed fires, wood stoves and fireplaces produce smoke that contain both PM 10 and PM 2.5 particulate matter of various levels. Other important pollutants are the emissions of CO caused by automotive (mobile) and recreational activities found throughout the Catamount Project Area. Air pollutants are emitted by both stationary and mobile sources. Stationary sources include factories, power plants, and agricultural burning. Stationary sources are not found in the Catamount Project Area but are found to the east and primarily in

lower flat areas of the western plains land and in urban settings. Mobile sources of pollution include automobiles, trucks, buses, and various types of recreational vehicles.

Large contributors of PM 10 pollutants include open burning of materials in residential areas as well as wood burning stoves and diesel-powered engines. Another source of PM10 includes wildfires. Wildfires, both natural and human-caused, are usually seasonal in nature. Heavy concentrations of PM10 and 2.5 particulates are generated from these wildfires and in particular during large, multiple day fire events. Smoke is also generated during prescribed fires (broadcast and/or pile burning) but to a much lesser extent. Prescribed fires are used to promote sustainability of ecosystems through fuels reduction within the forest. Prescribed burns are usually conducted at specific times of the year with favorable weather conditions for good smoke dispersion. Fall and spring seasons are typically periods of the year that allow for conducting controlled burns because conditions provide for proper dissipation of smoke. The proposed activities in the Catamount Project Area could affect the air quality of the local area as well as downwind communities. Dust and smoke that may be generated from these activities do contribute pollutants to the local airshed but are temporary and transient.

3.3.4 Air Quality Environmental Consequences

Effects Common to All Alternatives

All equipment exhaust and dust emissions associated with both alternatives are much less than emissions produced by prescribed fire applications. Emissions from all sources would be addressed by mitigation measures and evaluated at the time of on-site project plan preparation. Prescribed fire activities would have some short-term effects on air quality.

Alternative A (No Action) - Direct and Indirect Effects

No direct effects would occur because no actions would be taken under Alternative A (No Action). Indirect effects on forest stand structures and subsequently on wildfire behavior would occur in the Catamount Project Area. Air quality for the Catamount Project Area would remain in good condition. However, as wildfires increase in size and fire intensity increases, negative impacts would occur from increased smoke production. There would be a high probability that air quality would measurably change; air quality effects would be significant in the short-term (24-hours in duration); air quality impacts would be noticeable regionally. The effects on human health and air quality related values are expected to be significant during a wildfire event.

Alternative A (No Action) - Cumulative Effects

Alternative A would not address National, Agency, Forest, or local direction for reducing wildland fuel accumulations beyond existing forest management activities in the short-term. The cumulative effects of not undertaking actions to reduce wildland fuel accumulations would result in fire hazard and risk increasing as fuel accumulations build above current levels. In the long-term, greater effects to people and the environment from wildfire and fire suppression activities would occur. There would be a high probability that air quality would measurably change. Air quality impacts would be noticeable regionally. The effects on human health and air quality related values are expected to be significant during wildfire events.

Alternative B (Proposed Action) - Direct and Indirect Effects

Gambel Oak Treatment Areas

The direct effects of treating up to 1,500 acres in Gambel oak on air quality would be minor air quality effects from equipment exhaust and dust emissions associated with mechanical treatment and travel on roads. Emissions from these sources would be addressed by design measures and evaluated at the time of on-site project plan preparation. The indirect effects of these treatments would be to decrease wildfire intensity. Air quality would not change, or expected changes would be at or below the level of detection for the activities proposed. All equipment exhaust and dust emissions associated with the Gambel oak treatment by mechanical means is much less than what would be produced by prescribed fire applications. Air quality effects would be considered none to slight. No air quality mitigation measures would be necessary regarding these activities in the Gambel oak.

Aspen Treatment Areas

The direct effects of treating up to 2,200 acres of aspen on air quality would be minor air quality effects from equipment exhaust and dust emissions associated with mechanical treatment and travel on roads. Emissions from these sources would be addressed by design measures and evaluated at the time of on-site project plan preparation. The indirect effect of these treatments would be to maintain and, in some areas, increase the amount of aspen across the landscape. Aspen provides many benefits to the landscape, including natural fuel breaks, species diversity and important wildlife habitat. The proposed treatment activities in aspen stands would not change air quality, and any expected changes would be at or below the level of detection for the activities proposed. Air quality effects would be considered none to slight. No air quality mitigating measures would be necessary regarding these activities in aspen.

Ponderosa Pine Treatment Areas

The direct effects of treating up to 7,800 acres of ponderosa pine on air quality would be minor air quality effects from equipment exhaust and dust emissions associated with mechanical treatment and travel on roads. The prescribed fire activities would generate smoke that would have a direct, short-term effect on air quality. Air quality effects would be local and less than 24-hours in duration. Air quality mitigating measures may be needed and would likely be successful. There would be a low probability that air quality would be expected to measurably change.

The indirect effects of treating these ponderosa pine forests would result from open stand conditions in thinned areas that would encourage the development of understory grasses and shrubs. Overtime, this type of understory, combined with the thinned conditions, would create light ground fuels and a stand structure that could carry a low intensity fire with only occasional torching of individual crowns. If ground fires are allowed to burn through these stands occasionally, the more open environment could be maintained by discouraging the establishment of understory trees. Air quality would benefit in the long-term because these types of fires would generate much less smoke that wildfires. However, if fire is suppressed and no other means is used to maintain open conditions, stands would eventually grow back to the denser conditions that exist today and there is a potential that air quality would be negatively affected.

Mixed Conifer Treatment Areas

The direct effects of treating up to 7,600 acres of mixed conifer forest within the montane zone on air quality would be minor air quality effects from equipment exhaust and dust emissions associated with mechanical treatment and travel on roads. The prescribed fire activities would generate smoke that would have a direct, short-term effect on air quality. Air quality effects would be local and less than 24-hours in duration. Air quality mitigating measures may be needed and would likely be successful. There would be a low probability that air quality would be expected to measurably change.

The indirect effects of treating the mixed conifer forest within the montane zone would result from more open stand conditions in treated areas that would encourage the development of understory grasses and shrubs. These stand conditions would benefit air quality in the long-term because wildfires burning through these areas would be smaller and less intense, therefore, generating less smoke.

Fuel Breaks

The direct effects of creating up to 2,000 acres of fuel breaks on air quality would be minor, short-term air quality effects from equipment exhaust and dust emissions associated with mechanical treatment and travel on roads. The prescribed fire activities would generate smoke that would have a direct, short-term effect on air quality. Air quality effects would be local and less than 24-hours in duration. Air quality mitigating measures may be needed and would likely be successful. There would be a low probability that air quality would be expected to measurably change.

The indirect effects of these fuel breaks would be to decrease wildfire extent and intensity. Air quality would not change, or expected changes would be at or below the level of detection for the activities proposed. There would be a low probability that air quality would be expected to measurably change. Air quality effects would be local and less than 24-hours in duration. Air quality mitigating measures may be needed and would likely be successful. The resulting air quality would not be affected in the long-term.

Alternative B (Proposed Action) - Cumulative Effects

Alternative B would address National, Agency, Forest, or local direction for reducing wildland fuel accumulations beyond existing forest management activities in the short-term. The proposed treatments under this alternative would alter overstory canopies, understories, and surface and ladder fuels that contribute to a lowering of fire hazard. The reduction of fire hazard would contribute to less erratic fire behavior resulting in less smoke generated during wildfires. There would be a low probability that air quality would be expected to measurably change as a result of implementing the proposed actions. Air quality effects would be local and less than 24-hours in duration. Air quality mitigating measures may be needed and would likely be successful. In the long-term, effects on human health and air quality related values are not expected to be significant. The proposed actions under Alternative B (Proposed Action) in combination with more recent and future foreseeable vegetation treatments in surrounding areas would not have a cumulative effect on air quality because the smoke generating activities would be coordinated.

3.4 Watershed/Soils

This section is divided into two; watershed, and soils. The discussion is summarized from the Catamount Forest Health & Hazardous Fuels Reduction Project Watershed/Soils Specialist Report (JW Associates 2010d).

3.4.1 Watershed Affected Environment

Watershed boundaries were developed used the existing national network of delineated watersheds (Federal Geographic Data Committee 2004). Sixth-level (12-digit) watersheds, typically 16-63 square miles or 10,000-40,000 acres, were used to characterize and frame this analyses for the Catamount Project Area. There 14 sixth-level watersheds in the Catamount Project Area (Table 5). The total watershed area is greater than the Catamount Project Area because portions of the watersheds are located outside of the Catamount Project Area boundaries (Figure 16). The Catamount Project Area covers approximately 98,757 acres and the Vegetation Treatment Areas cover approximately 21,100 acres. The total watershed area for the 14 watersheds is 231,848 acres.

There are several watersheds that have been removed from the analysis due to no or very small acreages of proposed vegetation treatments in those watersheds (JW Associates 2010d).

Table 5. Catamount Project Area Watersheds

Sixth-level Watershed	Hydrologic Unit Code (HUC)	Watershed Area (acres)	Watershed Area in Catamount Project Area (acres)	Watershed Area in Catamount Project Area (%)
Rule Creek	101900020101	12,634	979	7.7%
Headwaters Trout Creek	101900020102	18,695	64	0.3%
Headwaters Four Mile Creek	110200020102	27,502	10,082	36.7%
Middle Beaver Creek	110200020501	15,738	6,380	40.5%
Headwaters West Beaver Creek	110200020502	20,931	6,912	33.0%
East Beaver Creek	110200020503	16,519	4,200	25.4%
Headwaters Fountain Creek	110200030201	27,919	20,902	74.9%
Ruxton Creek	110200030202	11,299	10,309	91.2%
Cascade Creek-Fountain Creek	110200030203	16,715	15,624	93.5%
Garden of the Gods	110200030204	19,887	6,953	35.0%
Cheyenne Creek	110200030301	15,840	11,031	69.6%
City of Colorado Springs-Fountain Creek	110200030303	11,740	4,199	35.8%
Rock Creek	110200030306	4,799	395	8.2%
Little Fountain Creek	110200030307	11,631	728	6.3%
	Totals	231,848	98,757	42.6%

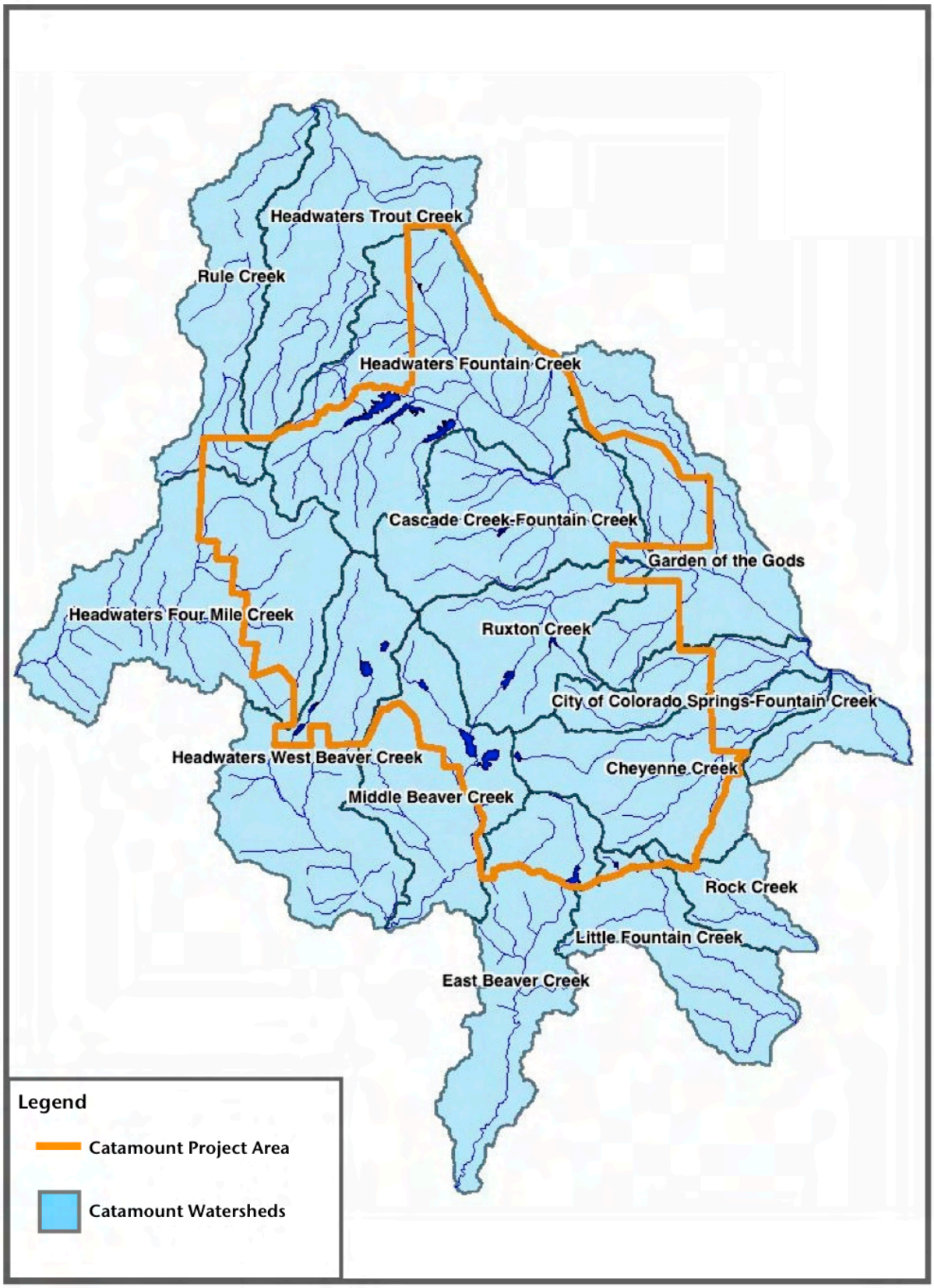

Figure 16. Catamount Project Area Watersheds

Watersheds that have no vegetation treatments proposed are;

- Middle Beaver Creek
- Headwaters West Beaver Creek
- East Beaver Creek

The watersheds listed above were removed from further analysis. In addition, several watersheds have 1 percent or less of their watershed areas proposed for vegetation treatments. The water quality, peak flows, water yield and sediment yield would not be affected due to the very small extent of proposed activities and the use of BMPs. These watersheds are;

- Rule Creek
- Headwaters Trout Creek
- Headwaters Four Mile Creek
- Little Fountain Creek

The remaining 7 watersheds are carried forward in this analysis.

The potential of a watershed to deliver sediments following wildfire depends on forest and soil conditions, the physical configuration of the watersheds, and the sequence and magnitude of rain falling on the burned area. High-severity fires can cause changes in watershed conditions that are capable of dramatically altering runoff and erosion processes in watersheds. Water and sediment yields may increase as more of the forest floor is affected by fire.

The Pikes Peak Watershed Assessment (JW Associates 2009) identified and prioritized sixth-level watersheds based upon their risks of generating flooding, debris flows and increased sediment yields following wildfires that could have impacts on water supplies (Front Range Watershed Protection Data Refinement Work Group 2009). The Catamount Project Area watersheds were all part of the Pikes Peak Watershed Assessment. Some of the components of that watershed assessment are used here to describe the existing conditions of watersheds in the Catamount Project Area.

Headwaters Fountain Creek Existing Conditions

The Headwaters Fountain Creek watershed is the largest watershed (27,919 acres) in the Catamount Project Area. Fountain Creek starts near Woodland Park and flows southeast next to Highway 24. Four major tributaries (Crystola Creek, North Catamount Creek, South Catamount Creek and Crystal Creek) flow from west to east, draining the flanks of Pikes Peak. Three large water supply reservoirs (North Catamount Reservoir, South Catamount Reservoir and Crystal Creek Reservoir) that supply water for the City of Colorado Springs are located on three of those tributaries.

The Headwaters Fountain Creek watershed was rated as a Category 4 for ruggedness (Table 6) which means that it is very steep and is relatively sensitive to debris flows following wildfires (Cannon and Reneau 2000). Road density of 3.4 miles of road per square mile of watershed was rated as a Category 4 (Table 6). Most of the roads in this watershed are located in vicinity of Woodland Park and along Fountain Creek near Highway 24. Soil erodibility was rated relatively low compared to the other watersheds (Table 6). However, this watershed does have a high percentage of granitic soils which increases the potential for erosion.

Table 6. Pikes Peak Watershed Assessment Hazard Rankings[7]

Watershed Name	Ruggedness	Ruggedness Hazard Ranking	Road Density (mi./sq.mi.)	Roads Hazard Ranking	Soils Hazard Ranking
Headwaters Fountain Creek	0.2313	4	3.44	4	2
Ruxton Creek	0.3501	5	0.77	1	4
Cascade Creek-Fountain Creek	0.2880	5	1.05	1	3
Garden of the Gods	0.1647	2	6.33	5	3
Cheyenne Creek	0.2460	4	2.76	3	5
City of Colorado Springs-Fountain Creek	0.3054	5	7.86	5	2
Rock Creek	0.2670	4	2.00	2	5

Ruxton Creek Existing Conditions

The Ruxton Creek watershed is about 11,299 acres in size and runs from the flanks of Pikes Peak east to Fountain Creek. The main stream in this watershed is Ruxton Creek with three major tributaries; Willow Creek, Lion Creek and Cabin Creek. Lake Moraine and Big Tooth Reservoir are located in this watershed and supply water for the City of Colorado Springs.

The Ruxton Creek watershed was given the highest rating (Category 5) for ruggedness (Table 6) which means that it is very steep and is sensitive to debris flows following wildfires (Cannon and Reneau 2000). Road density of less than one mile of road per square mile of watershed is very low and was rated as a Category 1 (Table 6). The few roads in this watershed are located at the bottom of the watershed in vicinity of Manitou Springs. Soil erodibility was rated relatively high at Category 4, compared to the other watersheds (Table 6). This watershed has a high percentage of granitic soils which increases the potential for erosion.

Cascade Creek-Fountain Creek Existing Conditions

The Cascade Creek-Fountain Creek watershed is about 16,715 acres in size. There are two streams that run from the flanks of Pikes Peak east to Fountain Creek. Cascade Creek drains into Fountain Creek and includes Severy Creek which has a population of greenback cutthroat trout. French Creek drains into Fountain Creek below Cascade Creek. French Creek contains Manitou Reservoir which supplies water to the Town of Manitou Springs. The Cascade Creek-Fountain Creek watershed also includes Waldo Canyon which is north of Fountain Creek and Highway 24.

The Cascade Creek-Fountain Creek watershed was given one of the highest ratings (Category 5) for ruggedness (Table 6) which means that it is very steep and is sensitive to debris flows following wildfires (Cannon and Reneau 2000). Road density of just over one mile of road per square mile of watershed is very low and was rated as a Category 1 (Table 6). The few roads in this watershed are located mostly in the Cascade Creek subwatershed in addition to Highway 24. Soil erodibility was rated moderate at Category 3, compared to the

[7] The hazard rankings are taken from the Pikes Peak Watershed Assessment. The hazard ranking categories were used in the prioritization and are numbered one though five, with one being the lowest ranking and five being the highest.

other watersheds (Table 6). This watershed has a high percentage of granitic soils which increases the potential for erosion.

Garden of the Gods Existing Conditions

The Garden of the Gods watershed is about 19,887 acres in size. There are two portions of the watershed divided by Fountain Creek. The subwatershed on the south side of Fountain Creek contains an unnamed stream that drains north into Fountain Creek. The portion to the north includes three streams that all run separately into to Fountain Creek; Williams Canyon, Black Canyon and Camp Creek. Palmer Reservoir is located on Camp Creek.

The Garden of the Gods watershed was given one of the lower ratings (Category 2) for ruggedness (Table 6) which means that it is not steep and is less sensitive to debris flows following wildfires (Cannon and Reneau 2000). Road density of over six miles of road per square mile of watershed is very high and was rated as a Category 5 (Table 6). This watershed contains the western edge of the City of Colorado Springs and the beginning of the Rampart Range road. Soil erodibility was rated moderate at Category 3, compared to the other watersheds (Table 6). This watershed has a less than half of the watershed with granitic soils which decreases the potential for erosion, compared to other watersheds.

Cheyenne Creek Existing Conditions

The Cheyenne Creek watershed is about 15,840 acres in size. Cheyenne Creek divides into North and South Cheyenne Creeks not far above its confluence with Fountain Creek. It runs from west to east and starts high on the flanks of Pikes Peak. Stratton Reservoir is located on North Cheyenne Creek.

The Cheyenne Creek watershed was rated as a Category 4 for ruggedness (Table 6) which means that it is very steep and is relatively sensitive to debris flows following wildfires (Cannon and Reneau 2000). Road density of 2.76 miles of road per square mile of watershed was rated as a Category 3 (Table 6). Most of the roads in this watershed are located in lowest part of the watershed in the City of Colorado Springs. Gold Camp road also runs through this watershed. Soil erodibility was rated as a Category 5, which is quite high compared to the other watersheds (Table 6). This watershed does have a high percentage of granitic soils which increases the potential for erosion.

City of Colorado Springs-Fountain Creek Existing Conditions

The City of Colorado Springs-Fountain Creek watershed is about 11,740 acres in size. There is one stream, Bear Creek, that runs from west to east into Fountain Creek just above Cheyenne Creek. The upper half of Bear Creek contains a population of greenback cutthroat trout.

The City of Colorado Springs-Fountain Creek watershed was given one of the highest ratings (Category 5) for ruggedness (Table 6) which means that it is very steep and is sensitive to debris flows following wildfires (Cannon and Reneau 2000). Road density of 7.86 miles of road per square mile of watershed is very high and was rated as a Category 5 (Table 6). Most of the roads in this watershed are located in lowest part of the watershed in the City of Colorado Springs. Soil erodibility was rated relatively low at Category 2, compared to

the other watersheds (Table 6). This watershed has a less than half of the watershed with granitic soils which decreases the potential for erosion, compared to other watersheds.

Rock Creek Existing Conditions

The Rock Creek watershed is the smallest watershed at 4,799 acres. It drains from west to east and eventually runs into Fountain Creek. It does appear that Rock Creek is not perennial east of Highway 115. The Rock Creek watershed was rated as a Category 4 for ruggedness (Table 6) which means that it is very steep and is relatively sensitive to debris flows following wildfires (Cannon and Reneau 2000). Road density of about two miles of road per square mile of watershed was rated as a Category 2 (Table 6). All the roads in this watershed are located in the highest and lowest parts of the watershed. Soil erodibility was rated as a Category 5, which is very high compared to the other watersheds (Table 6). This watershed does have a high percentage of granitic soils which increases the potential for erosion.

3.4.2 Watershed Environmental Consequences

This section describes the effects of Alternative A (No Action) and Alternative B (Proposed Action) on the watersheds of the Catamount Project Area. The analysis concentrates on the potential effects of the alternatives on water yield, peak flows, and sediment yield.

Water Yield

Increases in water yields from forest treatments have generally been regarded as a positive effect of forest management. Due to the limited amount of water available, many watershed studies have been conducted to determine how to increase water yield in ponderosa pine forests. MacDonald and Stednick (2003) conducted a recent literature review of water yield studies. That literature review found that water yield increases from timber harvesting are relatively short-lived, lasting on the order of 8-13 years. The magnitude of water yield increases tend to decline following treatments due to revegetation. Sheppard and Battaglia (2002) confirm the results of MacDonald and Stednick and add that the level of treatment needed would be 20-25 percent of the forest to realize and sustain increased water yields. Additional research on the cumulative effects of fuels reduction efforts has concluded that the consensus is that fuel management activities would likely not increase water yield unless more than 20 percent of the basal area in a watershed is removed (Elliot et al. 2010). For this analysis, potential water yield increases will be evaluated by the amount of total basal area removed by watershed.

Peak Flow

Forest management activities have been extensively studied with regard to the effects of timber harvesting and road building on changes in peak flows. The consensus in the literature is that peak flow changes from timber harvesting generally occur during drier seasons (Harr 1979) where the amount of evapotranspiration exceeds available soil moisture. During the summer and fall, the trees are generally transpiring soil moisture that is not being recharged by rainfall. When the tree density, and consequently transpiration, is reduced, the soil moisture remains higher and there is a greater potential for runoff from summer or fall storms.

Road drainage systems may alter a stream's hydrograph. These changes occur when subsurface and surface flow is captured at road cuts and in ditches, and redirected into a channel (USDA Forest Service 2001b). Roads can also direct water away from a stream (USDA Forest Service 2001b). The effects of road drainage can include an increase in the peak discharge, changes in the shape and timing of the hydrograph, increases in the total discharge, and potentially a decrease in water quality (USDA Forest Service 2001b). Roads that are in close proximity to streams and road-stream crossings may cause changes to a stream's hydraulic regime, reduction in water quality, and sedimentation (USDA Forest Service 2001b).

Increases in runoff and peak flow events following wildfire can be of concern where watershed features permit a higher probability of flooding and debris flows (Cannon and Reneau 2000). Increased runoff from burned areas, combined with erosion, may result in significant sedimentation downstream (Moody and Martin 2001).

Higher peak flows could result in changes in channel dynamic equilibrium. If the channel is moved out of dynamic equilibrium, the integrity of pools and riffles may be compromised and fish habitat quality could decrease. The most recent research findings have concluded that in snow zones, thinning less than 40 percent of a watershed would result in only a 14 percent increase in the size of peak flows (Elliot et al. 2010). Increases in peak flows by themselves do not constitute an adverse impact. However, when they adversely impact the beneficial uses of a stream they would be considered a violation of the Forest Plan. For this analysis, potential peak flow increases will be evaluated by the percentage of watersheds treated by treatment type.

Sediment Yield

Watershed cumulative effects from sediment are an important concern in managed watersheds (Megahan and Hornbeck 2000). Sediments that reach the stream system can stay in the channel for years and create instream sediment sources that may have impacts at the site and downstream. Riparian vegetation provides a wide variety of benefits to stream systems, including providing shade to control stream temperature, root strength to maintain stream banks, and input of nutrients that form the base of many aquatic food webs (Bisson et al. 1987). Riparian areas can also serve as filters for increased sediment generated upslope. Stream buffers have been shown to be very effective in moderating cumulative watershed effects (Thomas et al. 1993 and Elliot et al. 2010).

Sediment yield changes following forest management in ponderosa pine has been studied in several locations. Experimental watersheds in Arizona show that sediment yield in managed ponderosa pine forests were low (Rich et al. 1961) and most sediments moved during larger storms and originated from the channels and the logging roads (Rich and Gottfried 1976). Other studies have shown basically no changes in total sediment production from the various treatments in ponderosa pine compared to the control (Baker et al. 1999). In a recent study comparing the effects of thinning and a wildfire on sediment production in the Colorado ponderosa pine forests, Libohova (2004) found that thinning treatments in ponderosa pine generated basically no increased sediment yield.

Roads are considered the primary contributors of sediments to streams in managed watersheds (Swanson et al. 1981, Amaranthus et al. 1985, Rice and Lewis 1986, Bilby et al. 1989, Donald et al. 1996, Megan and Kidd 1972, Reid and Dunne 1984, Rothacher 1971, Sullivan and Duncan 1981, and Swift 1988). Roads can also impact the ecological integrity of a watershed in many ways. Roads built on erodible soils and with an improperly planned

road drainage network can impair the water quality in nearby streams (USDA Forest Service 2001b). Undersized culverts or bridges can wash out contributing to erosion and sedimentation to the levels that can be detrimental to other aquatic resources (USDA Forest Service 2001b).

Fuel Management WEPP (FuME WEPP) is one in a series of the USDA Forest Service's Internet-based computer programs based on the Agricultural Research Service's Water Erosion Prediction Project (WEPP) model. FuME WEPP is designed to predict runoff and sediment yield from fuels management activities. It compares background conditions to hillslope sedimentation from fuels management activities and wildfire. It was used to compare the changes in sediment yield from prescribed fire, thinning, use of roads and wildfire to the background conditions.

Forests generally have very low erosion rates unless they are disturbed. Common disturbances include prescribed and wildfire, and thinning operations. The impact of these operations, however, last only for a short time, perhaps one or two years. After that, the rapid regrowth of vegetation soon covers the surface with plant litter, and potential erosion is quickly reduced. In one study, Robichaud and Brown (1999) reported that erosion rates dropped from almost 40 Mg ha-1 the first year after a fire to 2.3 Mg ha-1 the second, and 1 Mg ha-1 the third year. The regrowth of vegetation and subsequent increase in canopy and ground cover overshadow any differences due to climate variation among the years. For any one of the given years, however, the potential erosion depends on the climate.

Alternative A (No Action) - Direct and Indirect Effects

Alternative A (No Action) would have no direct short-term effect on the watersheds of the Catamount Project Area. No vegetation treatments would be implemented under this alternative. Indirect effects include an increase in forest density over time that would have an increased risk of catastrophic wildfire compared to the existing conditions.

Alternative A (No Action) - Cumulative Effects

This section presents the potential cumulative effects of the past, present and future foreseeable actions in the watersheds of the Catamount Project Area (Table 5). Under Alternative A, there would be no vegetation treatments on National Forest System (NFS) lands in the Catamount Project Area. While the recent and on-going vegetation treatments on private lands within the Catamount Project Area would help to reduce stand densities and create a more diverse landscape, NFS lands account for more than 65 percent of the Catamount Project Area and 80 percent of the forested area. The cumulative effect of the past, present and reasonably foreseeable future actions on the condition of the forest vegetation in the Catamount Project Area under Alternative A, is an area dominated by forest stands that are generally healthy but relatively homogenous in age and structure and increasingly at risk to insects, disease, and wildfire.

Sediment, at some level, is naturally occurring in the environment. The stream systems have adapted to and function at different levels and ranges. The introduction of sediment from human associated activity, if excessive, can adversely impact stream function. Past activities, usually road related, in the Catamount Project Area have likely contributed the largest amount of sediment to the streams. Existing road stream crossings and other contributions from roads in the Catamount Project Area are expected to remain unchanged.

Cumulative impacts from sediment produced by the effects of high intensity wildfires would be expected if a large, intense wildfire burned in the Catamount Project Area. This alternative would be expected to have the highest number of acres classified at high fire risk of the alternatives (JW Associates 2010b). High intensity fires can cause chain reactions of events that can impact watersheds. In general, high severity burn areas experience significant duff reduction and loss in soil nutrients (Harvey et al. 1989) and soil heating (Hungerford et al. 1991). Water and sediment yields may increase as more of the forest floor is consumed (Robichaud and Waldrop 1994; Soto et al. 1994; and Wells et al. 1979). If fire consumes the duff and organic layers of the soil and the mineral soil is exposed, soil infiltration and water storage capacities of the soil are reduced (Robichaud 1996), which can result in increased erosion, runoff and sediment yield. Increased runoff from burned areas, combined with erosion, may result in significant sedimentation downstream (Moody and Martin 2001). Increased water yield and peak flows would also result from a high intensity wildfire.

Alternative B (Proposed Action) - Direct and Indirect Effects

Under Alternative B (Proposed Action) the design features listed in 2.3.2 Soil and Water Quality Protection would be required. In addition, Best Management Practices (BMPs) in Forest Service Handbook (FSH 2509.25) Watershed Conservation Practices Handbook (JW Associates 2010d) would be implemented.

Water Yield

Water yield would be expected to increase in the short-term from tree removal and consequent reduction of evapotranspiration. This analysis criteria for increases in water yield is estimated basal removal being not more than 20 percent in a watershed. The analysis that was completed to estimate basal area removal by watershed used the following assumptions;

- Treatments in aspen and Gambel oak would not create any changes in water yield because they would quickly resprout.
- Treatments in dry ponderosa, mesic ponderosa and mixed conifer would result in reductions in basal area of 60, 50 and 40 percent, respectively, for those areas treated.
- Changes in basal area on a watershed basis were estimated by converting the basal area removal to an acre basis. For example, mesic ponderosa treated in Ruxton Creek is estimated to be 241 acres. Assuming 50 percent basal area removal, the basal area removal by watershed would be estimated to be 120 acres, or 50 percent of 241 acres (Table 7).
- Analysis Areas are the sixth-level watersheds in Table 7.

Water yield increases would not be measurable in all watersheds. This conclusion is based on the estimated basal removal of not more than 20 percent in a watershed (Table 7). Water yield increases would have to adversely impact the beneficial uses of a stream before they would be considered a violation of the Forest Plan. Several recent studies have concluded that water yields have decreased substantially since the late 1800s (Elliot et al. 2010). The direct and indirect effects of Alternative B (Proposed Action) on water yields would be a slight potential to increase water yields in all watersheds listed in Table 7 but those changes would be less than measurable. The beneficial uses of streams in the watersheds that would have treatments would not be adversely impacted from potential increases in water yields.

Table 7. Water Yield - Basal Area Removal Analysis by Watershed[8] - Alternative B (Proposed Action)

Watershed Name	Watershed Area (acres)	Dry Ponderosa	Mesic Ponderosa	Mixed Conifer	Totals	Percent of Watershed
Headwaters Fountain Creek	27,919	325	1,025	1,241	2,591	9%
Ruxton Creek	11,299	12	120	315	447	4%
Cascade Creek-Fountain Creek	16,715	266	998	1,137	2,401	14%
Garden of the Gods	19,887	96	161	270	527	3%
Cheyenne Creek	15,840	153	490	555	1,198	8%
City of Colorado Springs-Fountain Creek	11,740	167	179	214	560	5%
Rock Creek	4,799	1	42	55	98	2%
Totals	**108,199**	**1,020**	**3,015**	**3,787**	**7,822**	**7%**

Peak Flows

The direct and indirect effects of Alternative B (Proposed Action) could result in increases in peak flows. The most recent research findings have concluded that in snow zones, thinning less than 40 percent of a watershed would result in only a 14 percent increase in the size of peak flows (Elliot et al. 2010). Increases in peak flows by themselves do not constitute an adverse impact. However, when they adversely impact the beneficial uses of a stream they would be considered a violation of the Forest Plan. For this analysis, potential peak flow increases will be evaluated by the percentage of watersheds treated by treatment type.

The analysis that was completed to estimate changes in peak flows by watershed used the following assumptions;

- Treatments in aspen and Gambel oak would not create any changes in peak flows because they would quickly resprout.
- Analysis Areas are the sixth-level watersheds in Table 8.

Peak flow increases would not be measurable in all watersheds. This conclusion is based on thinning in less than 40 percent of a watershed would result in only a 14 percent increase in the size of peak flows (Table 8). The Cascade Creek-Fountain Creek watershed is estimated to be at 39 percent of the watershed treated after full implementation of the Proposed Action. Activities in the Cascade Creek-Fountain Creek watershed would be staged throughout the 10 years of expected implementation of Alternative B (Proposed Action) to minimize the peak flow increases in that watershed. Elliot and others (2010) also state that "In conclusion, both the available data and our understanding of hydrologic processes indicate that thinning should generally have little or no effect on the size of peak flows."

8 The numbers in this table represent the number of acres within each watershed that represent 100 percent basal area removal. This analysis assumes that aspen and Gambel oak would quickly resprout and not create any changes in water yield. The basal area changes in dry ponderosa, mesic ponderosa and mixed conifer were estimated to be an average of 60, 50 and 40 percent, respectively, for treated stands.

Table 8. Peak Flow Analysis by Watershed - Alternative B (Proposed Action)

Watershed Name	Watershed Area (acres)	Vegetation Treatment (acres)	Percentage of Watershed	Aspen & Oak Treatment (acres)	Percentage of Watershed without Aspen & Oak
Headwaters Fountain Creek	27,919	6,986	25%	1,292	20%
Ruxton Creek	11,299	1,258	11%	209	9%
Cascade Creek-Fountain Creek	16,715	6,466	39%	1,184	32%
Garden of the Gods	19,887	1,778	9%	621	6%
Cheyenne Creek	15,840	2,847	18%	225	17%
City of Colorado Springs-Fountain Creek	11,740	1,219	10%	48	10%
Rock Creek	4,799	240	5%	18	5%
Totals	108,199	20,794	19%	3,597	10%

Peak flow increases would have to adversely impact the beneficial uses of a stream before they would be considered a violation of the Forest Plan. The direct and indirect effects of Alternative B (Proposed Action) on peak flows would have a potential increase in peak flows in Cascade Creek-Fountain Creek and changes in all other watersheds that are less than measurable. The beneficial uses of streams in the watersheds that would have treatments would not be adversely impacted from potential increases in peak flows.

Sediment Yield

The direct and indirect effects of Alternative B (Proposed Action) could result in increases in sediment yield. However, increases in sediment yield by themselves do not constitute an adverse impact. However, when they adversely impact the beneficial uses of a stream they would be considered a violation of the Forest Plan.

Estimated changes in sediment yield were estimated using the FuME WEPP model. The model was run for three slope categories; 10, 20 and 30 percent. The model compares background average annual hillslope sedimentation to that generated from prescribed fire, thinning, wildfires and roads. These modeling runs estimate the changes for hillslopes that would be treated and are only estimates for those portions of the watersheds. Therefore, the estimates of increased sedimentation are scaled to a watershed basis by the area treated in those watersheds. For example, in the Cascade Creek-Fountain Creek watershed the sedimentation increase is the modeled increase times 0.39, because the treatments cover about 39 percent of the watershed.

The results for the FuME WEPP model are summarized by watershed in Table 9. The results show that the effects of thinning are predicted to be greater potential sedimentation sources than prescribed fire for all watersheds. The effects of prescribed fire are predicted to be less than one percent for all watersheds (Table 9). The effects of thinning, which include increased road use, are predicted to be approximately a three percent increase over background, or less (Table 9). The combined effects of thinning, road use and prescribed fire added together are predicted to be approximately four percent, or less.

The FuME WEPP model also predicts the effects of wildfire intensity reduction that would result from the thinning and prescribed fire treatments. These results are presented only as a combined effect of thinning, prescribed fire, road use and wildfire intensity reduction. These results show a combined sedimentation reduction of between 3 and 27 percent (Table 9).

Table 9. FuME WEPP Increased Sedimentation by Watershed

Watershed Name	Thinning Effects	Prescribed Fire Effects	Combined Thinning & Prescribed Fire Effects	Combined Thinning & Prescribed Fire Effects with Wildfire Intensity Reduction
Headwaters Fountain Creek	2.1%	0.6%	2.7%	-17.2%
Ruxton Creek	0.9%	0.3%	1.2%	-7.7%
Cascade Creek-Fountain Creek	3.2%	0.9%	4.1%	-26.7%
Garden of the Gods	0.7%	0.2%	1.0%	-6.2%
Cheyenne Creek	1.5%	0.4%	1.9%	-12.4%
City of Colorado Springs-Fountain Creek	0.9%	0.2%	1.1%	-7.2%
Rock Creek	0.4%	0.1%	0.5%	-3.4%

Roads are considered the primary contributors of sediments to streams in managed watersheds (Swanson et al. 1981, Amaranthus et al. 1985, Rice and Lewis 1986, Bilby et al. 1989, Donald et al. 1996, Megan and Kidd 1972, Reid and Dunne 1984, Rothacher 1971, Sullivan and Duncan 1981, and Swift 1988). In a recent study comparing the effects of thinning and a wildfire on sediment production in the Colorado ponderosa pine forests, Libohova (2004) found that thinning treatments in ponderosa pine generated basically no sediment yield. Roads on the granitic derived soils in the Catamount Project Area can be major sources of sediment due to the highly erodible nature of these soils. No new system roads would be constructed in Alternative B (Proposed Action). Temporary roads would be used but would be reclaimed after use.

Riparian areas serve as filters for sediment generated upslope. Stream buffers have been shown to be very effective in moderating cumulative watershed effects (Thomas et al. 1993 and Elliot et al. 2010). The Soils and Water Quality Design Features (see *2.3.2 Soil and Water Quality Protection*) include a 100-foot buffer that would minimize the chances of erosion from upland areas reaching streams.

With the full implementation of the BMPs (JW Associates 2010d) and the design features listed in 6.2.1 Soils and Water Quality Design Features, the amount of increased sediment from harvest activities would not be expected to result in a significant impact on water quality. The direct and indirect effects of Alternative B (Proposed Action) on sediment yield would be a potential slight increase in sediment yield in the short-term (less than five years) and a potential decrease in sediment in the long-term (greater than five years) in the Catamount Project Area.

Alternative B (Proposed Action) - Cumulative Effects

This section presents the potential cumulative effects of the Alternative B (Proposed Action) and past, present and future foreseeable actions in the watersheds of the Catamount Project Area.

In 1984 the Colorado Springs Utilities Water Resource Department initiated a cooperative watershed management program with the Colorado State Forest Service. With the aid of the State Forest Service vegetation treatments have been implemented on lands managed by Colorado Springs Utilities within the Catamount Project Area. On-going and future foreseeable treatments on these lands by watershed include:

- 143 acres of thinning in Longs Ranch in the Cascade Creek-Fountain Creek watershed
- 309 acres timber harvest in Ruxton Creek watershed
- 400 acres of thinning in Ruxton Creek watershed
- 114 acres of prescribed burn (in an area previously thinned) in Headwaters Fountain Creek watershed

Additional fuel hazard reduction treatments may also be implemented as a result of several Community Wildfire Protection Plans (CWPP) that have been developed for communities within the area. These include the Ute Pass CWPP and the Tiller County CWPP. These treatments would be primarily within the wildland urban interface and treat areas at the lower elevations. Most likely within the ponderosa pine, Gambel oak, and Douglas-fir cover types.

Just north of the Catamount Project Area in the Headwaters Trout Creek watershed, vegetation treatments have recently been implemented on several thousand acres of National Forest as part of the Trout West project. Vegetation treatments included thinning, creating openings and prescribed burning. These treatments were primarily within the ponderosa pine and Douglas-fir cover types. Forests within these recently treated areas as less dense and have more openings than what generally exists within the Catamount Project Area. Alternative B (Proposed Action) has less than 10 acres proposed in the Headwaters Trout Creek watershed so there would be no cumulative effects in that watershed.

The only watersheds that would have potential cumulative effects would be Cascade Creek-Fountain Creek and Ruxton Creek, because these are the only watersheds with future foreseeable actions that are in watersheds with vegetation treatments in Alternative B (Proposed Action).

The cumulative effects on water yield would be similar to the direct and indirect effects (see Section 6.2.2 Direct and Indirect Effects). This conclusion is based on the estimated changes in basal area including the activities in the Cascade Creek-Fountain Creek and Ruxton Creek watersheds. Ruxton Creek watershed would increase from 4 to 7 percent which keeps it well below the 20 percent criteria. Cascade Creek-Fountain Creek watershed would increase by 0.4 percent to 15 percent. Therefore, these two watersheds would not experience cumulative effects on water yield.

The cumulative effects on peak flows would be similar to the direct and indirect effects (see Section 6.2.2 Direct and Indirect Effects). This conclusion is based on the estimated percentage of watersheds treated including the activities in the Cascade Creek-Fountain Creek and Ruxton Creek watersheds. Ruxton Creek watershed would increase from 9 to 16 percent which keeps it well below the 40 percent criteria. Cascade Creek-Fountain Creek watershed would increase less than one percent to remain at 32 percent. Therefore, these two watersheds would not experience cumulative effects on peak flows.

3.4.3 Soils Affected Environment

Soils within the Catamount Project Area are derived from decomposed Pikes Peak Granite parent material. The parent rock is deeply weathered granite composed of quartz and orthoclase, with biotite being an accessory mineral. The granite is composed of large crystals that are released as the biotite weathers. These large crystals then form a mass of coarse-grained material with little clay to serve as binding material and as exchange medium for soil nutrients. These soil particles are highly erodible and may be relatively unproductive due to a lack of soil nutrients. Soils developed from Pikes Peak Granite are pinkish in color due to the feldspars contained in the parent material.

Soils in the Catamount Project Area are generally sandy or gravelly textured and shallow in depth. Surface horizons are sandy loam in texture, with some organic accumulations at the surface. Rock and gravel content increases with depth. The surface soils become increasingly coarse with an increase in slope gradient. In the better vegetative sites, an "A" horizon can generally be found, as well as a weak "B." Generally, development consists of and A-C structure, with very limited "B" development. Soils range from 0 inches in the rock types to 40 inches in some timber types and valley bottoms.

The decomposed, granitic soils within the Catamount Project Area can be eroded when disturbed due to their lack of cohesion. However, due to their coarse nature, they are not easily compacted except during road or trail construction and use. Studies have found that these decomposed, granitic soils maintain high infiltration rates even when used for skid trails (Libohova 2004).

3.4.4 Soils Environmental Consequences

The analysis of the effects of the proposed actions on soils focuses on compliance Forest Service Handbook (FSH 2509.25) Watershed Conservation Practices Handbook. Management Measure 13 states "Manage land treatments to limit the sum of severely burned soil and detrimentally compacted, eroded, and displaced soil to no more than 15 percent of any activity area." For this analysis, potential soil productivity impacts will be evaluated by the percentage of soil impacts in any activity are compared to the 15 percent standard.

Alternative A (No Action) - Direct and Indirect Effects

Alternative A (No Action) would have no direct short-term effect on the soils of the Catamount Project Area. No vegetation treatments would be implemented under this alternative. Indirect effects include an increase in forest density over time that would have an increased risk of catastrophic wildfire compared to the existing conditions.

Alternative A (No Action) - Cumulative Effects

The potential cumulative effects of the past, present and future foreseeable actions on soils include recent and on-going vegetation treatments on private lands within the Catamount Project Area. Under Alternative A, there would be no vegetation treatments on National Forest System (NFS) lands in the Catamount Project Area. No cumulative effects on soils would be realized because there is no activity on soils on National Forest System lands.

Alternative B (Proposed Action) - Direct and Indirect Effects

The analysis of the effects of the proposed actions on soils focuses on compliance Forest Service Handbook (FSH 2509.25) Watershed Conservation Practices Handbook. For this analysis, potential soil productivity impacts will be evaluated by the percentage of soil impacts in any activity are compared to the 15 percent standard.

Vegetation treatment activities, including felling, skidding, decking, transporting of logs off-site, and slash disposal, can affect soil resources. Potential effects to soil resources include soil compaction and displacement. Soil erosion can occur when rainstorms occur on sites where the ground cover has been removed and the infiltration rate of soils has been reduced due to compaction.

Vegetation treatments and associated soil disturbance in Alternative B (Proposed Action) would be managed to limit the sum of severely burned and detrimentally compacted, eroded, and displaced land to no more than 15 percent of any land unit. No new system roads would be constructed and temporary roads would comply with BMPs and Soils and Water Quality Design Features. Current similar vegetation treatments that have been implemented in the Trout-West project just north of the Catamount Project Area are meeting the 15 percent standard.

With the full implementation of the BMPs (JW Associates 2010d), the design features listed in *2.3.2 Soil and Water Quality Protection*, and managing disturbances to less than 15 percent of units, the harvest activities would not be expected to result in significant impacts on soil productivity. The direct and indirect effects of Alternative B (Proposed Action) on soil productivity would be a potential slight decrease in soil productivity in the short-term (less than five years) and a potential increase in soil productivity in the long-term (greater than five years) in the Catamount Project Area. Long-term increases in soil productivity could be achieved from the increases in ground cover due to the opening of the forest canopy in treated areas.

Alternative B (Proposed Action) - Cumulative Effects

The potential cumulative effects of the past, present and future foreseeable actions on soils include recent and on-going vegetation treatments on private lands within the Catamount Project Area. The *Watershed Alternative B (Proposed Action) Cumulative Effects* section describes the locations and extent of activities on other ownerships. The activities on National Forest System lands would be evaluated to determine if the activity areas would be adjacent to those on other ownerships. If they would be adjacent then the amount of soil disturbance should be carefully planned to keep the activity area under the Forest Plan standard of 15 percent of the activity area. The cumulative effects of Alternative B (Proposed Action) on soil productivity would be a potential slight decrease in soil productivity in the short-term (less than five years) and a potential increase in soil productivity in the long-term (greater than five years) in the Catamount Project Area. Long-term increases in soil productivity could be achieved from the increases in ground cover due to the opening of the forest canopy in treated areas.

3.5 Wildlife

Wildlife is divided into three sections; Management Indicator Species (MIS), Federal Listed Species and Regional Forester's Sensitive Species. The environmental consequences section for federal listed and sensitive species is combined. The discussion is summarized from the Catamount Forest Health & Hazardous Fuels Reduction Project Management Indicator Species Specialist Report (JW Associates 2010e) and Catamount Forest Health & Hazardous Fuels Reduction Project Wildlife/Fisheries Biological Assessment/Biological Evaluation (JW Associates 2010f).

3.5.1 Management Indicator Species Affected Environment

The National Forest Management Act of 1976 directs the USDA Forest Service to manage habitats to maintain viable populations of existing native and desired non-native vertebrate species. In accordance with 36 Code of Federal Regulations (CFR) 219.19, fish, wildlife, and plant MIS are selected as a basis for evaluating the potential effects of federal actions on the forest biota.

MIS are selected at the Forest-scale because their population changes are believed to indicate the effects of management activities. An evaluation of the Pike and San Isabel National Forest MIS and their habitats was conducted to identify MIS for this project-level analysis (Table 10). If an MIS or its habitat was not found in the Catamount Project Area, it was not identified for further analysis. The rationale for dismissing the other MIS species from further consideration is presented in the Catamount Forest Health & Hazardous Fuels Reduction Project Management Indicator Species Specialist Report (JW Associates 2010e).

Abert's Squirrel - Natural History and Distribution

The Abert's squirrel has been identified as an MIS as an ecological indicator for late succession ponderosa pine. This species is dependent on ponderosa pine-dominated stands with open understory for both nesting sites and foraging (Keith 1965, 2003). Target feed trees represent less than 10 percent of the trees in stands populated by Abert's squirrel along Colorado's Front Range, and they are chemically and physiologically different from trees not used (Allred and Gaud 1994). Tree chemistry also may affect nest-site selection. On the Pike and San Isabel National Forest, surveys show approximately 92 percent of nests were in a tree group with 75 percent having 3 or more interlocking canopy trees. Hypogenous fungi are an important part of their diet, and bone and antlers are often gnawed for their mineral content (Pederson et al. 1987).

Table 10. Evaluation and Description of Pike and San Isabel National Forest MIS and Habitats[9]

MIS Species	Status	Suitable Habitat Present?	Documented or expected to be present?	Rationale
Abert's Squirrel *(Sciurus abertʟi)*	MIS	Yes	Yes	Occurs in late succession ponderosa pine; Abert's squirrel is ecologically dependent on ponderosa pine with open understory for both nesting sites and food, and therefore generally limited to open montane forests.
American Elk *(Cervus elaphus)*	MIS	Yes	Yes	Preferred habitat varies widely and includes coniferous forests associated with rugged, broken terrain or foothill ranges. During summer, elk spend most of their time in high mountain meadows in the alpine or subalpine zones or in stream bottoms.
Brook Trout *(Salvelinus fontinalis)*	MIS	Yes	Yes	Optimal stream habitat for brook trout is characterized by clear, cold water, silt-free rocky substrate in riffle-run areas, well-vegetated stream banks, abundant in-stream cover, deep pools, relatively stable flow regime and stream banks, and productive aquatic insect populations. Brook trout have a strong association with beaver ponds and tend to hold along undercuts, submerged brush piles, and beaver lodges and dams.
Greenback cutthroat trout *(Oncorhynchus clarki stomias)*	TES MIS	Yes	Yes	Preferred habitat typically consists of clear, swift-flowing mountain streams with cover such as overhanging banks and vegetation; this species is also known to occur in lakes. Existing greenback populations are restricted to small, remote, high-elevation streams and lakes where populations often have been protected by natural and human-made fish movement barriers.

Long-term trends in Abert's squirrel populations have not been measured or monitored, but they can be deduced based on known changes to ponderosa pine habitat. Squirrel populations in Colorado were undoubtedly more abundant 150 years ago before ponderosa pine forests were subjected to logging, grazing, and fire suppression. Squirrel abundance and habitat capability varied spatially, depending on local forest conditions. Their populations probably decreased sharply after European settlement, remained low as forests re-established themselves, and gradually increased to their present levels as older trees became established.

Current Abert's squirrel population trend estimates for Colorado suggests stable or increasing abundance. The Natural Diversity Information Source (NDIS) database states that the species is fairly common in both El Paso and Teller Counties (NDIS 2010). Extensions of the known range have occurred in recent years in southwest and western Colorado (Davis and Bissell 1989). Population dynamics are poorly known (Fitzgerald et al. 1994). Population estimates range from 12 to 30 animals per square kilometer in the Black Forest of El Paso County, and from 82 to 114 per square kilometer near Boulder. Population estimates contain spatial and temporal variation, which are attributed to normal cyclic variations in annual biomass production of pine seeds (Patton 1985, Pederson et al. 1987). On the Pike and San Isabel National Forest, preliminary data from recent

9 MIS = Management Indicator Species; TES = federally threatened or endangered status

surveys found an increase in squirrel sign between 2006 and 2008 in examined plots (USDA Forest Service 2010c).

Elevated Mountain Pine Beetle (*Dendroctonus ponderosae*) populations in Colorado in recent years have resulted in ponderosa pine mortality. Direct effects to Abert's squirrel populations on the Pike and San Isabel National Forest or in Colorado have not been quantified. In areas inhabited by Abert's squirrels that experience high mortality of mature ponderosa pine, squirrel populations could remain the same or decrease depending on squirrel densities prior to the pine beetle attack and the extent of ponderosa pine mortality. Squirrel populations on the Pike and San Isabel National Forest will likely decline and range expansion subside or retract until quality Abert's habitat stabilizes (USDA Forest Service 2009). Other range-wide threats to Abert's habitat include forestry treatments that reduce acreage of mature ponderosa pine and uncharacteristically large and severe wildfires in ponderosa pine. Abert's squirrels are considered a small game species in Colorado and hunting is permitted with a valid hunting license (USDA Forest Service 2009).

There are approximately 10,000 acres of ponderosa pine that are potential Abert's squirrel habitat in the Catamount Project Area (Table 11). It should be noted that not all of these acres are likely to provide suitable habitat for the squirrel. If 10 percent of the trees are assumed to be chemically suitable for Abert's, an unknown, but presumably many fewer acres of suitable habitat exist in the study area.

Table 11. Approximate Acres of Potential Abert's Squirrel Habitat[10]

Habitat Quality	Catamount Project Area	Pikes Peak Ranger District	Pike and San Isabel National Forest
High	3,000	31,000	108,000
Moderate	3,000	18,000	73,000
Forage	4,000	17,000	31,000
Total	10,000	66,000	212,000

American Elk - Natural History and Distribution

Elk was selected as an MIS because of the public's interest in hunting and viewing them. Elk also have specific habitat management guidelines in the 1984 Forest Plan (USDA Forest Service 1984).

Elk tend to inhabit coniferous forests associated with rugged, broken terrain or foothill ranges. During summer elk spend most of their time in high mountain meadows in the alpine or subalpine zones or in stream bottoms (Adams 1982). Studies of elk slope preferences indicate that elk use a variety of slopes, although they choose slopes in the 15- to 30-percent class most frequently (Skovlin 1982). Elk may use more open areas during spring and summer because of earlier spring green-up (Edge et al. 1987). During hot summer months, elk seek shaded, cool habitats (Leege 1984). Use of forage areas depends on proximity to cover. Use is typically

10 Source: USDA Forest Service 2010a.
*All habitat structural stages are for ponderosa pine dry and mesic habitats only. High quality = mature greater than 40 percent crown cover; Moderate quality = mature less than 40 percent crown cover; Forage = Sapling/Pole.
All values are rounded to nearest 1,000 acres.

concentrated to within 200 to 600 feet of cover edge. Either cover or forage may be limiting to elk, particularly on winter ranges or calving habitats (Roderick and Milner 1991). Due to the history of fire suppression and resultant decrease in forest openings, forage is likely to be the limiting factor in the Catamount Project Area. Open road densities greater than 1.5 miles per square mile of habitat on summer range or 1.0 mile per square mile of habitat on winter range are also considered a limiting factor (Rodrick and Milner 1991).

The CDOW annually monitors elk at the data analysis unit (DAU) scale to assess changes in population trends. A DAU is an area an elk population uses throughout the year and is comprised of one or more game management units. All DAUs in the Pike and San Isabel National Forest are currently above the CDOW's defined long-term objectives. The Catamount Project Area is located within DAU E-23.

Global and Colorado elk populations are known to be increasing (COVERS 2001). They are intensively managed, and there are good data on population size and trends (Fitzgerald et al. 1994). Elk are expanding their range due to reintroductions, management, and habitat conversion (COVERS 2001). Elk populations have generally increased in Colorado since 1975. Elk populations are high due to limited hunting pressure and available habitat.

The structure, composition, and landscape pattern of vegetation used by elk in the Pike and San Isabel National Forests, particularly the lower montane zone, has been substantially altered from its pre-European conditions by cumulative human impacts. Before logging, grazing, and fire suppression, ponderosa pine stands along Colorado's Front Range were less dense, more open, and less vulnerable to diseases, insects, and large, intense wildfires (Foster Wheeler Environmental Corporation 1999). Additional factors that affect elk activity and population size include disturbance from human activities such as recreation, roads, and hazardous fuels reduction. The Forest Plan (USDA Forest Service 1984) provides some specific treatment guidance in big game management areas (Management Area 5B) that is unique from other habitat prescriptions.

According the NDIS (NDIS 2010) database, the Catamount Project Area represents approximately 2 percent of winter range, 5 percent of severe winter range, 7 percent of summer range, and 13 percent of the production area in the Pike and San Isabel National Forest (Table 12).

Table 12. Acres of Elk Summer and Winter Range[11]

MIS Species (Elk) Habitat Type	Acres of Potential Elk Habitat on National Forest Lands		
	Catamount Project Area	Pikes Peak Ranger District	Pike and San Isabel National Forest
Winter Range	8,000	37,800	473,200
Severe Winter Range	2,700	10,700	53,500
Summer Range	82,500	250,300	1,159,900
Production Area	10,000	11,600	73,300

11 Source: NDIS 2010. All values are rounded to nearest 100 acres

Brook Trout - Natural History and Distribution

Brook trout were selected as an MIS because: 1) the public has a high concern for this species and its habitat; and 2) the public has a high interest in fishing. Brook trout were retained as MIS due to a potential role as an indicator species for aquatic habitat and because they pose a recovery threat to greenback cutthroat trout (USDA Forest Service 2005a).

Brook trout are a non-native species introduced in Colorado streams sometime after European settlement. They spread quickly throughout Colorado mountain streams competing directly with the native cutthroat trout species. Brook trout have displaced native trout from most of Colorado's high mountain streams, which is one reason that greenback cutthroat trout is a federally threatened species. Optimal stream habitat for brook trout is characterized by clear, cold water, silt-free rocky substrate in riffle-run areas, well-vegetated stream banks, abundant in-stream cover, deep pools, relatively stable flow regime and stream banks, and productive aquatic insect populations (Raleigh 1982).

The CDOW, USFWS, and many other land management agencies have reclaimed many streams and lakes to remove brook trout as part of an intensive effort to restore native trout species in Colorado (USFWS 1998a). Brook trout do provide recreational fishing opportunities but are a minor component of the overall fishery in Colorado. Brook trout populations on the Forest tend to be located below the greenback cutthroat trout recovery areas. Because the greenback populations need to be protected from the superior competitor non-native trout species, their populations are kept at higher elevations above natural and human-made stream barriers. Brook trout surveys, combined with greenback population monitoring, provide a more thorough assessment of the relationship between some management activities and issues (USDA Forest Service 2005a).

Impacts from logging, fires, river impoundment, road and railroad construction, land clearance for agriculture and human habitation, and encroachment of introduced rainbow trout and brown trout and infection with whirling disease are the primary threats to brook trout (Larson and Moore 1985, USDA Forest Service 2005b). Introduction of hatchery-reared brook trout from the northeastern US has also affected native populations.

The USDA Forest Service conducted baseline inventories of trout populations in small streams in the Pike and San Isabel National Forest between 2003 and 2007. Fish in 26 area streams were sampled at least twice. Where brook trout were present, their densities ranged from 51 fish per hectare to 17,582 fish per hectare and averaged 1,894 fish per hectare. Population trend statistics cannot be determined with the limited data available for the established sample sites. No brook trout were captured in streams in the Catamount Project Area (USDA Forest Service 2007a).

Greenback Cutthroat Trout - Natural History and Distribution

Greenbacks are native to the South Platte and Arkansas River basins in central Colorado and perhaps southeastern Wyoming (USFWS 1998a). Existing greenback cutthroat trout populations are restricted to small, remote high-elevation streams and lakes where populations often have been protected by natural and human-made fish movement barriers. Greenbacks favor relatively clear, cool waters, preying primarily on aquatic and terrestrial invertebrates. Many of these habitats are colder, less productive, and undergo significant flow fluctuations, leading to small, slow-growing trout populations (Young 1995, Harig and Fausch 2002, Coleman and Fausch 2007).

Greenback cutthroat trout populations declined rapidly following immigration and settlement of the Front Range of Colorado in the mid- to late 1800s. Mining pollution, stream dewatering for agriculture, commercial harvest, and introduction of non-native salmonids decimated populations. Greenback cutthroat trout readily hybridize with rainbow trout and cannot persist symbiotically with brook trout or brown trout. Introductions and invasions by nonnative trout eliminated greenback cutthroat trout from most of their historical range (Harig et al. 2000). Their decline occurred so rapidly that their distribution was not well known (USFWS 1998a). Greenback cutthroat trout were federally listed under the Endangered Species Act of 1973 (ESA) as endangered in 1973 and later downlisted to threatened in 1978. Greenback cutthroat trout recovery is the Pike and San Isabel National Forest fishery program's number one priority, as the bulk of the pure genetic greenback populations, and available habitat occur on the Forest. In accordance with the Forest Plan (USDA Forest Service 1984), the USDA Forest Service has worked closely with the CDOW and USFWS to implement the Greenback Cutthroat Trout Recovery Plan (USFWS 1998a), resulting in the reintroduction of greenbacks into 30 kilometers of stream habitat and 32 hectares of lake habitat on the Pike and San Isabel National Forest as of 2005 (USDA Forest Service 2005a). Today, eight populations on the Pike and San Isabel National Forest are afforded protection under the ESA and contribute to recovery and delisting goals and objectives (USDA Forest Service 2009). Recent genetic work by Metcalf and others (2007), Martin (2008), and Martin and others (2005), however, suggest that five of these populations consist of genetically hybridized cutthroat trout or pure strain Colorado River cutthroat trout more similar to populations west of the Continental Divide in the Colorado River basin than to greenback cutthroat trout populations in the Arkansas or South Platte rivers. The USFWS has not yet changed the protection status of these populations. Therefore, the Pike and San Isabel National Forest continues to provide the populations full protection status until otherwise directed by USFWS. Continued threats to the species in the Catamount Project Area include non-native fishes and degradation of riparian and stream habitat by recreational vehicles.

Populations of greenback cutthroat trout are known or likely to exist in Severy Creek, Bear Creek and North Cheyenne Creek within the Catamount Project Area. Severy Creek is believed to be a genetically pure population of greenback cutthroat trout. Metcalf and others (2007) analyzed the nuclear and mitochondrial DNA of specimens from the Bear Creek population in 2007 and found that it represented a unique haplotype. Further genetic testing is being conducted. The USDA Forest Service and CDOW are currently investigating the population in North Cheyenne Creek to determine status. All three populations are being managed as federally threatened species for the purposes of this project.

3.5.2 Management Indicator Species Environmental Consequences

For each species, effects analysis is provided on the direct and indirect impacts to: (1) habitats; and (2) each specific species. Cumulative impacts and species viability are bounded by the Pikes Peak Ranger District and a period of 20 years. The analysis and determinations assume that the features listed in *2.3 Design Features* would be implemented. The indicators listed below are used to measure impacts of the project on wildlife and fish habitat:

- Pine structural stage diversity (resulting structural stage distributions);
- Aspen communities (acres enhanced);
- Snag retention (number of snags per acre); and
- Water quality effects (changes to water quantity and quality).

Alternative A (No Action) - Direct and Indirect Effects - MIS Habitats

There would be no direct effects of Alternative A (No Action) l, as no new actions would occur. Long-term, indirect effects would vary depending on habitat type. In general, Alternative A (No Action) would maintain existing habitat and protect biodiversity in the short-term. Long-Term, the proportion of ponderosa pine cover type in the Catamount Project Area would be expected to rise as it continues to encroach into existing open areas and hardwood stands. Early successional habitats would continue to decline as pine stands progress toward later seral stages, which would not comply with Forest Plan goals and management direction, as it would not increase wildlife habitat diversity or provide or enhance habitat for the recovery of sensitive species. Natural disturbances such as wildfire and pine beetle outbreak would continue to return portions of the forest in which they occur to early successional stages.

Alternative A (No Action) - Direct and Indirect Effects - MIS Species

There would be no direct effects of Alternative A (No Action) because no new actions are proposed. Indirect and cumulative effects would occur as a response to current conditions in the absence of active management, other than fire suppression efforts. These effects are discussed below for each MIS species.

Abert's Squirrel

Assuming a continuation of fire suppression policies, continued forest succession would lead to the development of more mature ponderosa pine stands. More mature stands with interlocking canopies would favor increased breeding and thus have a beneficial effect on Abert's squirrel populations. The availability of open ponderosa pine habitat, however, would continue to decrease as forest understory growth continues and dense canopy continues to develop. Dense late-successional stands would lead to an increased risk of high-severity wildfire. Should a stand-replacing fire occur, it could cause significant adverse effects to Abert's squirrel habitat.

American Elk

The continuation of current fire suppression policies would increasingly limit elk foraging habitat, as the growth of seral vegetation, aspen, oak, and other desirable shrubs would not be promoted. Meadow habitat would also increasingly be reduced due to conifer encroachment. Cover habitat would be maintained or

increase as forest succession continues, but cover habitat is not likely to be a limiting factor in the Catamount Project Area. Long-Term, this alternative is likely to produce a decrease in available habitat.

Brook Trout

Assuming a continuation of fire suppression policies, the late successional pine forest would increase. Dense late-successional stands would lead to an increased risk of high-intensity wildfire. Should a stand-replacing fire occur, erosion from burned hillsides could increase sediment loading in Catamount Project Area streams leading to a decrease in brook trout habitat as well as result in a risk of direct mortality.

Greenback Cutthroat Trout

Assuming a continuation of fire suppression policies, late successional pine forest would increase. Dense late-successional stands would lead to an increased risk of catastrophic wildfire. Should a stand-replacing fire occur, erosion from burned hillsides in Severy, Bear or North Cheyenne Creek watersheds, sediment loading in these streams could increase and have an adverse affect on trout habitat as well as result in a risk of direct mortality.

Alternative A (No Action) - Cumulative Effects

The existing habitat conditions are the result of the past and present human activities on NFS and private lands within the Catamount Project Area. These activities, including logging, mining, and fire suppression, have altered the natural disturbance regimes of the forest. Without additional active forest management over the next 20 years, ponderosa pine density in the Catamount Project Area would likely increase and structural diversity decrease. Such conditions would reduce habitat diversity overall. Alternative A (No Action) would also contain the largest risk of wildfire and pine beetle outbreak, which could return areas of the forest in which they occur to early successional stages. Should stand-replacing wildfire occur, increased erosion, runoff, and sediment yield could negatively impact riparian and aquatic areas.

Alternative A (No Action) - Population Viability

Given the absence of direct, ground-disturbing activities, Alternative A (No Action) would not affect species population trends or overall viability. In the event of a stand-replacing wildfire in the Catamount Project Area, MIS species and their habitats may be adversely affected; however, the local effects would generally not impair overall population trends and/or viability of the species. One notable exception is for Greenback Cutthroat trout, as the genetic makeup of the populations present in the planning area is not currently established, a stand-replacing fire could impact species viability if the Bear Creek population represents a genetically unique population. Alternative A (No Action) would have no effect on or contribution to meeting Forest Plan objectives for each MIS described.

Alternative B (Proposed Action) - Direct and Indirect Effects - MIS Habitats

In general, there would be short-term impacts to wildlife habitat availability during treatments; however, over the long-term there would be improved quantity, diversity, and quality of habitat as well as decreased risk of habitat loss due to stand replacing wildfire. As a result of the treatments, the conifer forest would be slightly reduced in the Catamount Project Area due to created openings. There would be an increase in the diversity of understory plants within many pine stands due to reduced forest canopy cover and disturbance caused by

thinning and prescribed fire. In addition, cutting of diseased trees may occur in limited sites. These treatments would open up these stands and improve forest health. Treatment of aspen stands would remove diseased trees and reduce conifer competition, thereby improving health and vigor. Disturbance created by prescribed fire would also help stimulate the regeneration of the less shade-tolerant plant species within these stands. Treatments would also improve the diversity of structural stages, as displayed on Figures 8, 9 and 10. Alternative B (Proposed Action) would move the Catamount Project Area closer to historic forest conditions.

Alternative B (Proposed Action) - Direct and Indirect Effects - MIS Species

Abert's Squirrel

Under Alternative B (Proposed Action), direct impacts include the potential for some short-term disturbances or displacement of Abert's squirrels during project implementation activities and potential removal of Abert's feeding or nesting trees in some circumstances. However, in the majority of circumstances, medium and large ponderosa pine trees would not be removed, as treatments in mature ponderosa pine stands would favor leaving clumps of trees and a stand structure that is more reflective of the historical conditions before the fire-suppression era began. In addition, project design criteria (*2.3 Design Features*) provide for the protection of trees currently used by Abert's and/or creation of Abert's squirrel nest tree clumps (0.1 acre of 9- to 22-inch dbh ponderosa pine with a basal area of 180 to 220, if available, and interlocking canopy) per six acres in ponderosa pine per Forest Plan guidelines (Forest Plan, pg. III – 29). Although not all trees provide suitable habitat for Abert's squirrels due to the specific requirements of tree chemistry for feed trees; basal area and canopy closure of trees in a stand have consistently been significantly related to squirrel density (Ratcliff et al. 1975, Patton et al. 1985, Pederson et al. 1987, Dodd et al. 1998). In addition, States and Gaud (1997) found a reduced abundance of hypogeous fungi used by squirrels in stands with the least basal area. These studies, among others, suggest that the preservation of existing feed trees as well clusters of interlocking trees with high basal areas may limit the impacts of forest treatments (Keith 2003).

Surveys have been conducted annually in the Pike and San Isabel National Forest since 2006 on approximately 2,000 acres of established plots containing various Abert's squirrel habitats under different management scenarios. Preliminary statistical analysis has showed more squirrel sign in untreated areas compared to areas with fuels treatment for 2006 only. When results across all sample years are pooled, however, there is significantly more squirrel sign in untreated areas as compared to treated areas (USDA Forest Service 2010b).

In the short term, vegetation treatments may negatively impact squirrel habitat, as indicated in the PSI monitoring studies. Over the long-term, the Proposed Action treatments in dry and mesic ponderosa pine habitat would likely improve Abert's squirrel habitat by opening up the forest understory and by reducing canopy densities that are outside of the historical range of variability. This would reduce competition for light, moisture, and nutrients, thereby accelerating the development of mature and old growth ponderosa pine stands, which is desirable for Abert's squirrel. Abert's squirrel habitat would return to pre-project levels if fires are not allowed to occasionally burn in the area, and would keep the forested and shrubby areas' canopy cover at low to moderate levels. If naturally ignited fires are allowed to burn in the area, the Catamount Project Area should maintain the quality and quantity of Abert's squirrel habitat that is comparable to the historical range

of variability. There is potential for a slight increase in the number of Abert's squirrels that can be supported over current levels due to more forage and improved stand structural components.

Habitat for Abert's Squirrels would be managed according to MIS direction in the Forest Plan (USDA Forest Service 1984). Alternative B (Proposed Action) has the potential to affect ponderosa pine habitat on 7,000 acres of the Catamount Project Area (Table 13). There are approximately 212,000 acres of ponderosa pine habitat within the high, moderate, or forage categories for Abert's squirrel on the Forest. Alternative B (Proposed Action) would therefore affect up to three percent of this habitat on the Forest. However, it is likely that the actual acreage treated under the Catamount project would be less than the numbers shown due to topography, accessibility, and other limitations. As such, Table 13 provides only a rough estimate of the post-project habitat conditions or quantities. It should be noted that the cumulative effects on Abert's squirrel habitat due to proposed projects throughout the forest may result in more acres treated and a higher percentage of Ponderosa Pine habitat impacted than shown below.

Table 13. Potential Abert's Squirrel Habitat Impacted by Alternative B (Proposed Action)[12]

Habitat Quality	Area in Catamount Project Area (acres)	Area within Dry and Mesic Ponderosa Pine Priority Treatment Area (acres)
High	3,000	2,000
Moderate	3,000	2,000
Forage	4,000	3,000
Total	10,000	7,000

American Elk

Proposed treatments could have some short-term negative impacts on elk and elk habitat due to fire, smoke, or disturbance or destruction of understory shrubs, forbs, and grasses from project-related activities. Project design criteria (*2.3 Design Features*) would limit disturbance to production (calving) areas by limiting disturbance in these areas between May 15 and June 30. Openings of 1 to 40 acres would be created over 20 to 25 percent of the treatment areas to restore historic conditions. Grasses and forbs would likely return to the disturbed areas in a year or two, while shrubs and seedling/sapling trees would take several years to return.

The proposed treatments are expected to have long-term beneficial impacts on elk forage quantity and quality in the Catamount Project Area. Thinning and burning would open up forested areas and allow for more forage production, while cutting small openings in aspen stands would promote its regeneration and also provide better-quality elk foraging habitat as new aspen suckers, grasses, forbs, and browse plants develop from cutting and burning treatments. Elk forage quality and quantity would improve over pre-project levels. Over the longer term, elk forage quality and quantity would return to pre-project levels if fires are not allowed to

[12] Source: USDA Forest Service 2010. All habitat structural stages are for ponderosa pine habitats only. High quality = Forest Service Region 2 sensitive species 4B, 4C, or 5; Moderate quality = Forest Service Region 2 sensitive species 4A; Forage = Forest Service Region 2 sensitive species 3A, 3B, or 3C. All values are rounded to nearest 1,000 acres.

occasionally burn in the area and keep the forested and shrubby areas' canopy cover at low to moderate levels. If naturally ignited fires are allowed to burn in the area, the Catamount Project Area should maintain the quality and quantity of elk foraging that is comparable to the historical range of variability.

The proposed treatment area contains elk summer range, winter range, severe winter range, and production areas, as well as summer and winter concentration areas. Potential elk habitat in the treatment area, however, is minor in relation to that available on the Pike and San Isabel National Forest overall and the Pike Peaks Ranger District (Table 12). Up to 24,700 acres of summer range, 3,600 acres of production area, 2,800 acres of winter range habitat, and 600 acres of severe winter range could be affected by proposed treatments (Table 14) under Alternative B (Proposed Action). However, it is likely that the actual acreage treated would be less than the numbers shown due to topography, accessibility, and other limitations. As such, Table 14 provides only a rough estimate of the post-project habitat conditions and/or quantities. Treatments would likely not result in a measurable change in elk populations or trends. Given the wide distribution, abundance, stable or increasing population trend, and game status of elk, there are no population viability concerns.

Table 14. Acres of Elk Habitat Impacted by the Proposed Action[13]

Habitat Type	Area in Catamount Project Area (acres)	Area within Priority Treatment Area (acres)
Winter Range	8,000	2,800
Summer Range	82,500	24,700
Severe Winter Range	2,700	600
Production Area	10,000	3,600

Brook Trout

There would be no direct effects to brook trout or its habitat as a result of Alternative B (Proposed Action). Project activities could result in minor runoff and sedimentation increases and ash litter due to prescribed fires, as well as ground disturbance with subsequent erosion from heavy machinery and vehicles in the Catamount Project Area. However, project design criteria (*2.3 Design Features*) for riparian areas are incorporated into the project to ensure that impacts to streams and riparian areas are minimized. In the long-term, project treatments would reduce the risk of erosion into Catamount Project Area streams from intense wildfire or precipitation events; refer to the Greenback cutthroat trout section, below, for more details. Treatments would likely not result in a measurable change in brook trout populations or trends.

Greenback Cutthroat Trout

There would be no direct effects to greenback cutthroat trout or its habitat as a result of Alternative B (Proposed Action). Project activities could result in minor runoff and sedimentation increases and ash litter due to prescribed fires, as well as ground disturbance with subsequent erosion from heavy machinery and vehicles in the Catamount Project Area outside of greenback cutthroat watersheds. Project design criteria for riparian areas (*2.3 Design Features*) are incorporated into the project to ensure that impacts to streams and

13 Source: NDIS 2010. All values are rounded to nearest 100 acres.

riparian areas are minimized. In addition, project design criteria include specific measures for greenback cutthroat trout watersheds. For Bear, Severy and North Cheyenne Creeks, the project fisheries biologist and silviculturist would be consulted to determine suitable thinning activities and locations, if any. To avoid adverse effects, only hand-thinning treatments would occur, and broadcast prescribed burns would be prohibited. Slash would be piled and burned outside of the Water Influence Zone.

In the long-term, the removal of slash and debris and the opening of forest canopy in some areas would stimulate new, more vigorous understory growth, and would ultimately enhance soil stability, thereby reducing erosion and sedimentation potential. Furthermore, in the long-term, Alternative B (Proposed Action) would reduce the potential for large-scale, stand-replacing fires in the Catamount Project Area that could contribute to major erosional events.

With successful implementation of the design criteria (*2.3 Design Features*), short-term effects to greenback cutthroat trout habitat are anticipated to be negligible. Overall, Alternative B (Proposed Action) has the potential to enhance watershed health in the Bear, Severy and North Cheyenne Creek drainages, which would ultimately benefit the greenback cutthroat trout and its habitat. Some benefit to trout habitat in Severy Creek may occur due to treatment in neighboring watersheds which would reduce the overall risk of catastrophic wildfire in the area. For the purposes of ESA consultation, the analysis of Alternative B (Proposed Action) results in a determination of "may affect, not likely to adversely affect" the greenback cutthroat trout and its habitat. Refer to the Catamount Forest Health & Hazardous Fuels Reduction Project Wildlife/Fisheries Biological Assessment/Biological Evaluation (JW Associates 2010f) for more detailed information.

Alternative B (Proposed Action) - Cumulative Effects

Alternative B (Proposed Action) when combined with other reasonably foreseeable future forest health and fuels treatments projects, including Colorado Springs Utilities and other USDA Forest Service undertakings, would continue to lower risks of stand-replacing fires, reduce susceptibility to insect and disease epidemics, and stimulate regeneration and new growth of vegetation throughout the Catamount Project Area. Specifically, Colorado Springs Utilities has ongoing or proposed forest thinning projects of up to 700 acres, prescribed fire on up to 280 acres, and commercial timber harvest on up to 600 acres in the Pikes Peak Watershed (Colorado State Forest Service 2009, 2010). Privately owned forest lands within and adjacent to the Catamount Project Area may also provide suitable habitat. Continued fuel treatments on private lands would likely continue to affect habitat, thereby increasing the importance of habitat on NFS lands.

In addition to forestry activities, other management at the state and federal level would continue to impact MIS species. Specifically, state management of elk harvest would continue to be one of the factors that affect elk populations.

The incremental contribution of Alternative B, including enhancement of habitat throughout the Catamount Project Area, when combined with other past, present, or reasonably foreseeable future actions, would have minor long-term, but generally beneficial cumulative effects on MIS species habitat quality in the Pikes Peak area.

Alternative B (Proposed Action) - Population Viability

Abert's Squirrel

Alternative B (Proposed Action) treatments would have long-term beneficial effects on Abert's squirrel habitat suitability. Treatments in ponderosa pine habitat would mimic natural succession and disturbance processes and would create a mosaic of habitat conditions over time. Project design criteria (*2.3 Design Features*) would provide for the protection of adequate existing and potential squirrel nest tree clumps.

Understory treatments would also improve foraging habitat for the Abert's squirrel. In general, Alternative B (Proposed Action) would contribute to meeting Forest Plan objectives for Abert's squirrel. Assuming standards, objectives, and guidelines are met Forest-wide, there would be adequate habitat to maintain Abert's squirrel populations across the Forest.

American Elk

Treatments proposed in Alternative B (Proposed Action) would provide long-term improvements to foraging habitat in elk summer and winter range within the Catamount Project Area. The incorporation of small patch cuts would ensure diversity of cover types in the long-term. Overall cover would be affected by the removal of forest vegetation during mechanical treatments; however, cover is not likely to be the limiting factor in the forest. In general, Alternative B (Proposed Action) would contribute to meeting Forest Plan objectives for elk. Assuming standards, objectives, and guidelines are met Forest-wide, there would be adequate habitat to maintain elk populations across the Forest under Alternative B (Proposed Action).

Brook Trout

Alternative B (Proposed Action) is intended to reduce the potential for a future stand-replacing wildfire in the Catamount Project Area, which could ultimately have adverse effects on the viability of brook trout locally. Effects to brook trout after implementation of design criteria (*2.3 Design Features*) are expected to be minimal and short-term. In general, Alternative B (Proposed Action) would contribute to meeting Forest Plan objectives for brook trout and to maintaining adequate habitat for brook trout populations in the Forest.

Greenback Cutthroat Trout

As described above, Alternative B (Proposed Action) is intended to reduce the potential for large-scale stand-replacing wildfires in the Catamount Project Area, thereby decreasing the risk of erosion into greenback cutthroat trout watersheds. Project design criteria (*2.3 Design Features*) are incorporated to minimize or prevent adverse effects to greenback cutthroat trout populations as a result of treatment activities. With the incorporation of design criteria, impacts to greenback cutthroat trout would be negligible to minimal. In general, Alternative B (Proposed Action) would contribute to meeting Forest Plan objectives for greenback cutthroat trout and to maintaining adequate habitat for populations in the Forest.

3.5.3 Federal Listed Species Affected Environment

This section is a summary of the analysis on federal listed species (endangered, threatened, and proposed) presented in the Catamount Forest Health & Hazardous Fuels Reduction Project Wildlife/Fisheries Biological

Assessment/Biological Evaluation (JW Associates 2010f). Only those federal listed species known or with a potential to occur or be affected by the proposed alternatives were analyzed (Table 15). Species are eliminated from further analysis by meeting one or more of the following conditions:

- The species does not occur or is not expected to occur in the Catamount Project Area during the time period activities would occur;
- The species occurs in habitats that are not present; and/or
- The Catamount Project Area is outside of the geographical or elevational range of the species.

Table 15. Federal Listed Threatened, Endangered and Candidate Species Considered for Analysis[14]

MIS Species	Status	Rationale
Greenback cutthroat trout *(Oncorhynchus clarki stomias)*	T, MIS, t	Well-oxygenated headwaters of mountain streams. Restricted to only a few small drainages on the Pike and San Isabel NF per recent genetic studies.
Gunnison's prairie dog (montane population) (*Cynomys gunnisoni*)	C	High mountain valleys and plateaus at elevations of 1,830 to 3,660 meters; open or slightly brushy country, scattered junipers, and pines (NatureServe 2010)
Preble's meadow jumping mouse (*Zapus hudsonius preblei*)	T	North-central Colorado in riparian habitat below 7600 feet and in adjacent uplands within 300 feet of riparian habitat. Portions of riparian habitat in the Catamount Project Area meet habitat criteria.
Mexican spotted owl (*Strix occidentalis lucida*)	T	Mixed conifer habitat (Douglas-fir, ponderosa pine, white fir) located in steep, rock-walled canyons. Portion of the Catamount Project Area contain designated Critical Habitat or protected habitat.

Greenback cutthroat trout are addressed in the MIS section (*3.5.1 Management Indicator Species Affected Environment*) above. The rationale for dismissing the other federal listed species from further consideration is presented in the Catamount Forest Health & Hazardous Fuels Reduction Project BA/BE (JW Associates 2010f).

Designated Critical Habitat

Areas designated as critical habitat are areas that may require special management considerations and are essential for the conservation of the species (USFWS 2004). In 2004, the USFWS revised its 2001 critical habitat designation to include approximately 8.6 million acres for the Mexican spotted owl (MSO) in portions of its range in the southwest (USFWS 2004). Approximately 16,932 acres within the priority treatment area have been designated as critical habitat. Reviews would be conducted prior to project initiation to confirm the presence of suitable habitat within designated critical habitat in the Catamount Project Area. The USFWS is proposing to revise the 2003 critical habitat designations for the Preble's meadow jumping mouse (PMJM) in

14 T = Threatened, E = Endangered, C = Candidate, t = State threatened, MIS = Management Indicator Species

Colorado (USFWS 2009). Units of the proposed revised critical habitat are located in El Paso and Teller Counties; however, none of the current or proposed revised areas are within the Catamount Project Area.

Mexican Spotted Owl - Natural History and Distribution

The MSO is geographically isolated from the northern and California subspecies. The range extends from Mexico into the southwest states of Arizona, New Mexico, Texas, Colorado and Utah. Historical records for the MSO in Colorado are very rare, and the historical distribution is very difficult to infer (Foster Wheeler Environmental Corporation 1999). This species was listed by the USFWS in 1993. In 2004, the revised designated critical habitat was released, including 8.6 million acres on federal lands in Arizona, New Mexico, Colorado, and Utah (USFWS 2004). The Catamount Project Area contains approximately 34,000 acres of designated critical habitat within critical habitat unit SRM-C-1a. This critical habitat unit encompasses portions of El Paso, Teller, and Fremont counties. It should be noted that there are some areas within the critical habitat boundaries that do not and cannot support the primary constituent elements and are, by definition, not considered to be critical habitat, even though they are within the identified mapped boundaries (USFWS 2001).

Protected habitat, as defined in the 1995 Recovery Plan, refers to Protected Activity Centers (PACs) and all other areas that are in mixed conifer and pine/oak types with slope greater than 40 percent where timber harvest has not occurred in the past 20 years and administratively reserved lands. Protected habitat receives the highest level of protection under the recovery plan (USFWS 1995). Protected habitat guidelines are intended to protect all occupied nesting and roosting habitat areas, as well as all unoccupied steep slopes and reserved lands (USFWS 1995). The PACs are at least 600 acres in size and include the best possible MSO habitat with the nest or roost site as near to the center as possible (USFWS 2001). The PAC includes approximately 75 percent of the foraging area of an owl, and management activities are restricted or banned in the PAC (USFWS 2001). There are no PACs in the Catamount Project Area. PACs in the vicinity of the Catamount Project Area include the Rock Creek and Little Fountain Creek PACs.

Due to the mixed-conifer vegetation type and steep slopes in the Catamount Project Area, 4,800 acres in the Catamount Project Area meet the definition of protected area outside of PACs. Due to project design criteria which exclude areas with slope over 35 percent from mechanical thinning and harvest treatments that utilize heavy equipment or machinery, the actions within this area would be minimal. Additional conservation measures for protected areas are included in protected habitat guidelines and are applicable to all proposed treatments in the Catamount Project Area, as stated in the project design criteria (*2.3 Design Features*).

Restricted habitat, as defined in the 1995 recovery plan, refers to potential nesting and roosting habitat in unoccupied areas. Restricted habitat areas include ponderosa pine, Gambel oak and mixed-conifer forests, as well as riparian environments. In restricted habitat areas the landscape should be managed to sustain or promote nesting habitat that is well distributed spatially. The priority treatment area contains approximately 7,000 acres of restricted habitat. The objective of the restricted habitat guidelines is to manage the landscape in order to maintain and create replacement MSO habitat where appropriate while providing a diversity of stand conditions and stand sizes across the landscape, to minimize threats to the MSO, to retain and enhance important but difficult-to-replace habitat elements, and to provide management flexibility. The restricted

habitat guidelines are applicable to all proposed treatments in the Catamount Project Area. These guidelines are included in project design criteria (*2.3 Design Features*). A summary of critical, protected, and restricted habitat type in the Catamount Project Area, the district, and the Forest is shown in Table 16.

Table 16. Mexican Spotted Owl Habitat Summary[15]

Habitat Type	Catamount Project Area (acres)	Pikes Peak Ranger District (acres)	Pike and San Isabel National Forest (acres)
Protected Habitat	4,783	13,762	88,603
Restricted Habitat	7,143	54,750	316,008
Critical Habitat	34,061	68,527	400,869

Forested stands used by Mexican spotted owls have certain structural features in common. These structural conditions do not occur evenly throughout the landscape. Nesting and roosting stands exhibit certain identifiable features including high tree basal area, large trees, multi-storied canopy, high canopy cover, and decadence in the form of downed logs and snags (USFWS 1995). Target/Threshold habitat conditions have been developed for restricted habitat to protect appropriate nesting habitat structure where it currently exists and to manage other stands so that they develop the necessary structure over time (USFWS 1995). The USFWS used tree basal area, large tree (greater than 18 in dbh) density, and tree size-class distribution as the variables to define nesting and roosting Target/Threshold conditions (Table III.B. 1 in USDA Forest Service 1995, see Appendix B). The values provided in Table III.B.1 represent targets in that they define the desired conditions to be achieved with time and management and threshold conditions in that they define the minimum level that must be maintained for each constituent habitat element. Based on recovery plan guidelines, management activities can occur in stands that exceed these conditions, but the outcome of such activities cannot lower the stands below the threshold levels unless large-scale ecosystem assessment demonstrates that such conditions occur in a surplus across the landscape (USFWS 1995). Project design criteria incorporate Target/Threshold requirements for suitable MSO habitat.

MSO has been located on the Pikes Peak, South Platte, and San Carlos Ranger Districts on the Pike and San Isabel National Forest. Historic records include most of the Front Range. Spotted owls are residents of old-growth or mature forests that have complex structural components – uneven aged stands, high canopy closure, multi-storied levels, high tree density (USFWS 1995). Nesting habitat is typically in rocky canyons or forested mountains below 9,500 feet with high canopy closure, high stand density, and a multilayered canopy resulting from an uneven-aged stand (Kingery 1998). All nests in Colorado found to date occur on cliff ledges or in caves along canyon walls (USDA Forest Service 2006a). These include both sheer, slick rock canyons with scattered patches of Douglas-fir and steep canyons with exposed bedrock cliffs, with various tiers of exposed rock at various heights. The primary constituent elements for canyon habitat include one or more of the following attributes – cooler and often more humid conditions than the surrounding area; clumps or stringers of trees, or canyon walls containing crevices, ledges, or caves; a high percent of dead litter and woody debris; and riparian or woody vegetation. Foraging habitat generally has bigger logs, higher canopy closure, and greater densities of

[15] Source: USDA Forest Service 2009

trees and snags than random sites (USFWS 1995). Mated pairs of owls defend a breeding territory at least during the nesting season (March through August). Dispersal from the nest area usually occurs from mid-September to early October. MSO breed sporadically, and not all birds nest every year. Local conditions, particularly for the prey base, may govern nesting success (USFWS 1995).

Field Reconnaissance: Various field surveys for MSO have been conducted in the area, but no nesting owls have been confirmed. Camp Creek, east of the Catamount Project Area, is described in the Natureserve web site as the original location of Mexican spotted owl in the Pikes Peak region. Subsequent surveys in 1993 and 1994 did not relocate the birds, either in Camp Creek or in Williams Canyon to the west (Tapia 2010). Field surveys for the Mexican spotted owl were conducted in PACSs south of the Catamount Project Area at Rock Creek and Little Fountain Creek since 1993. A single owl was detected in 1993-1995 in Rock Creek and in 1993 and 1994 in Little Fountain Creek. No nests were found at either location. Rock Creek was subsequently surveyed in 1995-1999, 2002-2004 and 2010. Little Fountain creek was surveyed in 1996-1999, 2002-2004 and in 2007-2009. All surveys have found sites to be unoccupied. Surveys were also conducted in South Cheyenne Canyon and North Cheyenne Canyon in 1993, and in lower Bear Creek in 1994. These survey routes were subsequently dropped from second year surveys because habitat suitability was determined to be low. No other records exist that indicate the presence of MSO within the Catamount Project Area.

Gunnison's Prairie Dog - Natural History and Distribution

The USFWS issued a decision in February 2008 stating the montane populations of the Gunnison's prairie dog (GUPD) in Colorado were warranted but precluded for listing under the ESA (USFWS 2008). GUPDs inhabit shortgrass and mid-grass prairies, grass-shrub habitats in low valleys, and mesic, high elevation sites (5,039-12,008 feet) (CDOW 2009). Other habitat characteristics include the absence of rocky soils to allow for burrow digging (CDOW 2009), as well as slopes less than 15 percent. Steeper slopes when large areas with less variable slopes are present to allow for less obstructed views, increasing the prairie dog's ability to detect predators and warn conspecifics (CDOW 2009). GUPDs feed extensively on grasses, forbs, and sedges, but also consume insects. In Colorado, GUPDs are currently found in the southwestern and south central portions of the state. They occur in the San Luis Valley and South Park along the Arkansas River Valley from Twin Lakes to Pueblo, westward into the upper Gunnison River drainage, and in the Saguache and Cochetopa Park areas (Capodice and Harrell 2003). In central Colorado, GUPDs typically inhabit mountain parks, occurring at sites ranging in elevation from 1828 to 3657 meters (5997-11,998 feet). Recent surveys indicate that GUPD colonies are small, with fragmented distributions. The southeast population area as mapped by CDOW includes portions of the Catamount Project Area. Due to the isolated and fragmented nature of grasslands in the Catamount Project Area, however, habitat is not ideal. Threats to this species include bubonic plague – GUPD in the moister montane areas have been widely and severely affected (USFWS 2008).

Field Reconnaissance: Overall range for the species, as mapped by CDOW, covers the northwest portion of the Catamount Project Area. Two mapped populations of Gunnison's prairie dog occur within the Catamount Project Area boundary in the Chipita Park area on private land. Mapped habitat covers approximately 95 acres. Other suitable habitat may occur in mountain meadow openings.

Preble's Meadow Jumping Mouse - Natural History and Distribution

The Preble's meadow jumping mouse (PMJM) was proposed for listing in 1997 and was listed as threatened in 1998. Critical habitat was designated in July 2002 (USFWS 2002). There were five areas in the Upper South Platte watershed identified as critical habitat; four of these are in the Pike and San Isabel National Forest. Changes to critical habitat have been proposed (USFWS 2009). Units of the proposed revised critical habitat are located in El Paso and Teller Counties. Approximately 840 acres of the revised habitat is proposed on the Pikes Peak ranger district, however, no acres of the proposed habitat are within the Catamount Project Area. The PMJM is found in a variety of habitats but prefers low meadows for feeding. The USFWS has identified habitat for this species as being mature plains, riparian vegetation with relatively undisturbed grassland and a water source in close proximity, generally up to elevations of 7,600 feet, and in uplands within 300 feet of riparian areas. Decline of the Preble's meadow jumping mouse is linked to widespread habitat alteration – including conversion of grasslands to farms, livestock grazing, water development and management practices, and residential and commercial development (USFWS 2002). Areas that are heavily grazed by livestock or are burned, especially during the warm season, reduce structural habitat diversity and reduce availability of food resources necessary for the buildup of fat reserves before winter hibernation.

Field Reconnaissance: Potential PMJM habitat has been mapped in the Catamount Project Area based on USFWS criteria. Approximately 4,812 acres of potential habitat is found in the Catamount Project Area. Not all the mapped habitat may represent habitat with suitable conditions for PMJM. As stated above, the Catamount Project Area does not contain critical habitat (USFWS 2009).

3.5.4 Sensitive Species Affected Environment

This section is a summary of the analysis on USDA Forest Service Region 2 sensitive species (SS) presented in the Catamount Forest Health & Hazardous Fuels Reduction Project Wildlife/Fisheries Biological Assessment/ Biological Evaluation (JW Associates 2010f). Sensitive species are those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by:

- Significant, current, or predicted downward trends in population numbers or density; and/or
- Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (FSM 2670.5).

Region 2 developed a list of sensitive species that became effective December 1, 2003, and was revised in 2007. The Pike and San Isabel National Forest has since reviewed the Regional Sensitive Species List and identified species that occur, are suspected of occurring, or have habitat present in the Forest. Region 2 sensitive species with the potential to occur in the Pike and San Isabel National Forest were reviewed for consideration in this analysis. Only those sensitive species known or with a potential to occur or be affected by the proposed alternatives were fully analyzed (Table 17).

Table 17. Sensitive Species Considered for Analysis

R2 Sensitive Species	Suitable Habitat	Present	Rationale
American peregrine falcon *(Falco peregrinus anatum)*	Yes	Yes	Open habitat exists with cliffs present. Refer to effects analysis.
American three-toed woodpecker *(Picoides tridactylus)*	Yes	Yes	Species occurs almost exclusively in mature spruce stands. Refer to effects analysis.
Bald eagle *(Haliaeetus leucocephalus)*	Yes		Reservoirs and rivers. In winter, habitation may also occur locally, especially near reservoirs and open water. Wintering and migrating eagles may use the Catamount Project Area. Small amounts of summer foraging habitat also exists in the project area. Refer to effects analysis.
Boreal owl (Aegolius funereus*)*	Yes	Yes	Habitat includes mature spruce-fir or spruce- fir/lodgepole pine with meadows. Refer to effects analysis
Flammulated owl *(Otus flammeolus)*	Yes	Yes	Habitat includes old growth or mature ponderosa pine and ponderosa-Douglas-fir forests, often mixed with mature aspen; pure aspen; and old growth pinyon-juniper woodlands. Refer to effects analysis.
Lewis's woodpecker *(Melanerpes lewis)*	Yes	Yes	Habitat includes lowland and foothill riparian forests, agricultural areas, open burned areas with large snags, oak and cottonwood forests, and open, park-like ponderosa pine forests.
Northern goshawk *(Accipiter gentilis)*	Yes	Yes	Species nests primarily in dense, mature coniferous forests, and forages in a variety of forested areas and small openings. Refer to effects analysis
White-tailed ptarmigan *(Lagopus leucura)*	Yes		Habitat includes alpine tundra. Refer to effects analysis.
American marten *(Martes Americana)*	Yes	Yes	Habitat includes spruce-fir and mesic coniferous forests with complex physical structure on the ground. Refer to effects analysis.
Common hog-nosed skunk *(Conepatus leuconotus)*	Yes		Habitat includes Grasslands and foothills. Species prefers partly wooded brushy, rocky areas, particularly areas with oak brush and pinyon-juniper woodlands. Refer to effects analysis.
Fringed myotis *(Myotis thysanodes pahasapensis)*	Yes	Yes	Species is found at higher elevations in spruce habitat and mixed ponderosa pine, spruce and aspen habitat; roosts in a variety of structures including caves, mines, tunnels, snags, and buildings.
Rocky Mountain bighorn sheep *(Picoides dorsalis)*	Yes	Yes	Habitat includes cliffs, rock outcrops, and nearby meadows. Refer to effects analysis.
Townsend's big-eared bat *(Plecotus townsendii)*	Yes	Yes	Species forages on insects in a variety of habitats, including forested and wet areas, and requires suitable roots in a variety of structures including caves, mines, or rock ledges and overhangs. Refer to effects analysis.
Northern Wolverine *(Gulo gulo)*	Yes		Habitat includes alpine, spruce-fir in remote areas with limited disturbance. Refer to effects analysis.
Northern leopard frog *(Rana pipiens)*	Yes	Yes	Habitat includes wet meadows and the banks and shallows of marshes, ponds, glacial kettle ponds, beaver ponds, lakes, reservoirs, streams, and irrigation ditches. Elevation range extends up to 11,000 feet in southern Colorado.

Species are eliminated from further analysis by meeting one or more of the following conditions:

1. The species does not occur or is not expected to occur in the Catamount Project Area during the time period activities would occur;
2. The species occurs in habitats that are not present; and/or
3. The Catamount Project Area is outside of the geographical or elevational range of the species.

The rationale for dismissing the other sensitive species from further consideration is presented in the Catamount Forest Health & Hazardous Fuels Reduction Project BA/BE (JW Associates 2010f).

American Peregrine Falcon - Natural History and Distribution

The peregrine falcon is a rare spring and fall migrant in western valleys, foothills, lower mountains, mountain parks, and on the eastern plains. It is a rare summer resident in foothills and lower mountains. Numbers decreased over the past century, largely due to pesticide poisoning. In 1977, it was reported that only four nesting pairs existed in Colorado. Through recent reintroduction efforts the numbers have increased considerably, and the species now appears to be secure (Foster Wheeler Environmental Corporation 1999, USFWS 2006). Current threats to the species include the decline in habitat quality, particularly in riparian areas, and human disturbance of nest sites during recreational activities. Breeding pairs nest on cliff ledges typically 200 feet or higher, typically in foothill and mountain cliffs from 4,500 to 9,000 in elevation. Foraging habitat consists primarily of adjacent coniferous and riparian forests. Migrants and winter residents occur mostly around reservoirs, rivers, and marshes but may also be seen in grasslands and agricultural areas (Andrews and Righter 1992). Active eyries (nest sites) are known in the Pike and San Isabel National Forest (USDA Forest Service 1984). NDIS data indicates that this species is known to occur in both Teller and El Paso Counties, but the distribution is unknown. A peregrine falcon survey of the Pike and San Isabel National Forest in 1991 found no birds in the Catamount Project Area, but recorded birds were found in eight other sites. Suitable habitat is available in the Catamount Project Area, and nesting sites are known to occur in the Tenney Crags area.

American Three-toed Woodpecker - Natural History and Distribution

The main range of the American three-toed woodpecker extends through the Rocky Mountains and laterally across Canada to northern New England (Leonard 2001). This woodpecker is considered a rare year-round resident that is widely distributed throughout the coniferous forests of the northern and western portions of North America (Andrews and Righter 1992). The three-toed woodpecker is considered a rare summer and winter resident at elevations from approximately 8,000 to 11,000 feet, and a very rare winter resident between 5,000 and 8,000 feet (Andrews and Righter 1992). The species is a primary cavity nester. This woodpecker is associated with snag abundance and insect outbreaks from disease or fire. History of fire suppression has lead to fewer large-scale burned over areas but has also lead to highly favorable conditions for infestations of the wood-boring insects that this species primarily feeds upon. Seventy-five percent of their diet consists of wood-boring beetles, and in Colorado their abundance correlates with the abundance of the spruce bark beetle (Ehrlich et al. 1988).

Late-successional spruce-fir forest represents the core breeding and feeding habitat for the American three-toed woodpecker (Wiggins 2004). Where insect populations are high, it may also occur in ponderosa pine

Douglas-fir and lodgepole pine forest (Andrews and Righter 1992). Three-toed woodpeckers nest mainly in snags but will use live trees, especially those with heart rot. The most important snags are 12 to 16 inches dbh, 20 to 40 feet tall, and have bark still present (Nicholoff 2003). Optimal habitat includes areas with 42 to 52 snags per 100 acres, occurring in clumps (Nicholoff 2003). Threats to the species include incompatible forestry practices, deforestation, and fire-suppression activities. NDIS data indicates that the species is known to occur but rare in both Teller and El Paso Counties (NDIS 2010). Occurrence of American three-toed woodpeckers within the Catamount Project Area is not known. Potential habitat for the American three-toed woodpecker occurs in the Catamount Project Area, particularly in an area of about 50 acres on Mays Peak that burned within the last decade. Additional habitat may exist in spruce-fir forest found on about 15 percent of NFS lands in the Catamount Project Area and other conifer types, if insect levels are adequate.

Bald Eagle - Natural History and Distribution

The range of the bald eagle includes most of Canada and Alaska, all the contiguous US, and northern Mexico. Bald eagles are closely associated with water and are rarely seen far from aquatic environments. Breeding bald eagles are rare in Colorado. Although some nesting does occur, most eagles migrate in summer to northern breeding grounds but return to lower latitudes during the winter. Winter habitat for the bald eagle consists of roost trees along rivers and other large bodies of ice-free water that allow access to fish. The best available scientific and commercial data available indicates that survival rates of the bald eagle have recovered range wide (Federal Register 2007). As a result of this recovery, the bald eagle was removed from the list of endangered and threatened wildlife, effective August 8, 2007. Continued threats to the species include contamination in the environment, habitat loss, and human built structures such as powerlines. NDIS data indicate that the species is known to occur in Teller and El Paso counties, however, no information is available on abundance. No roost trees have been documented in the Catamount Project Area. Potential habitat for winter roosting occurs in the Catamount Project Area near the shores of Crystal Creek, Manitou, and Catamount Reservoirs. Summer foraging habitat is also found in the project area, near highway 288 at the southern boundary of the project area (NDIS 2010).

Boreal Owl - Natural History and Distribution

The boreal owl is a non-migratory species that has been observed as a resident in west-central Colorado and throughout the higher ranges of most of the state (Andrews and Righter 1992). Boreal owls are associated with mature spruce-fir forests, but can also be found in lodgepole pine, mixed conifer, Douglas-fir, and aspen interspersed with meadows (Udvardy 1977, Andrews and Righter 1992). The species inhabits coniferous woodlands occurring in the higher mountain areas statewide, from 9,500 to 11,500 feet in elevation (Andrews and Righter 1992). Nesting habitat includes mature spruce-fir adjacent to open meadows that provide prey species, especially voles. Nesting habitat typically includes a relatively high density of large trees (10 inches dbh and larger), open understory, and multilayered canopy (Hayward 1997). Boreal owls may use younger tree stands for foraging during the non-breeding season. Home ranges cover as much as 2,200 acres but can overlap extensively. Only a small area around the nest is defended during the breeding season. This species is a secondary cavity nester that utilize deserted woodpecker holes or natural cavities in snags with at least 15-inch dbh (Harrison 1979). Nesting and breeding activity most likely occurs from mid-February to late April, and

eggs are laid from April to June (Udvardy 1977). Threats to this species include changes in forest structure that influence prey populations, especially red-backed vole. Human disturbance and noise disturbance do not appear to be important factors in nest loss or owl movement (Hayward 1997). Boreal owls are expected to occur in the Catamount Project Area. Potential habitat exists in spruce-fir, which occur on around 15 percent of NFS lands in the Catamount Project Area, as well as in mature mixed conifer forest.

Flammulated Owl - Natural History and Distribution

Flammulated owls are associated with mature to old growth ponderosa pine and Douglas-fir forests along the Rocky Mountains. They have also been observed in aspen stands (Reynolds and Linkhardt 1992). Occupied territories are often on south-facing slopes and ridges. They are obligate cavity nesters and depend on flickers and other woodpeckers for creating nesting cavities. Their habitats have declined as a result of fire suppression and the resulting closure of understories (Foster Wheeler Environmental Corporation 1999). The species is almost entirely insectivorous, capturing insects on the ground, on vegetation, and in flight (Ehrlich et al. 1988). The flammulated owl breeds in mountain ranges from Central America, north through the western US and into southern British Columbia. It winters from Mexico into Central America (Sibley 2000). NDIS records show that this species is known to occur but is rarely found in El Paso County and is uncommon in Teller County (NDIS 2010). The Colorado Breeding Bird Atlas shows confirmed breeding across the western half of the state. Studies by Linkhart (2001) at Manitou Experiment Station in the Pikes Peak Ranger District have determined that habitat quality is determined by two primary factors – a) cavity-tree availability, in territories that had a mean of 1.5 cavity trees/acre; and b) forest type and structure, as productivity was positively correlated with territory area in ponderosa pine/Douglas-fir forests and with greater crown cover and large tree diameter (13-19" dbh). Use of the late-successional stage ponderosa pine/Douglas-fir forests likely involves habitat composition and structure and high prey availability. Older forests typically contain an abundance of snags and lightening-damaged trees with cavities for nesting. In addition, old ponderosa pine forests typically form open stands with well-developed grass and shrub understories that support arthropods used by fledged owlets and molting adults in late summer. The Catamount Project Area contains suitable habitat for flammulated owls in mature ponderosa pine forest found in the majority of ponderosa pine habitat, covering 14 percent of the NFS lands in the Catamount Project Area. The species is expected to occur in the Catamount Project Area.

Lewis's Woodpecker - Natural History and Distribution

Lewis's woodpecker is a year-round resident of the foothills of southern Colorado and occurs in lowland and foothill riparian areas, agricultural areas, and urban areas with tall deciduous trees, typically at elevations between 3,500 and 7,000 feet. Lewis's woodpeckers typically excavate nest cavities in soft ponderosa pine or cottonwood snags, although they will also re-use cavities made by other woodpecker species. They nest in large snags ranging from 12 to 45 inches dbh (Anderson 2003). Lewis's woodpeckers feed almost exclusively on emergent insects and specialize in flycatching in open habitats. These include open pine forests, burned areas, riparian and rural cottonwoods, and pinyon/juniper woodlands (Andrews and Righter 1992). Risks to Lewis's woodpeckers include activities that reduce open or old-growth ponderosa pine forests and snags – e.g., fire suppression and clearcutting (Anderson 2003). Current distribution of this species may have changed due to

lack of open ponderosa pine stands (NDIS 2010). NDIS lists this species as present in El Paso County. Data from the Colorado Breeding Bird Atlas (Kingery 1998) show this species typically breeding in riparian habitats, using cottonwoods to nest. The Catamount Project Area contains some suitable habitat in open, mature ponderosa pine forests (less then 40 percent canopy cover) which occur on approximately 50 percent of the ponderosa pine habitat type in the Catamount Project Area. The species is expected to occur in the Catamount Project Area.

Northern Goshawk - Natural History and Distribution

The first records of the northern goshawk distribution in the Front Range date back to 1873. Goshawks reuse the same territory year after year and sometimes reuse the same nest. Pairs typically have one or more alternate nests within the territory (Kingery 1998). Since they reuse established areas, they have been affected by historic and current logging operations. Birds are known to be sensitive to disturbance during the nesting season (Richarson and Miller 1997). The goshawk populations appear to be currently declining (Foster Wheeler Environmental Corporation 1999).

Goshawks inhabit mixed hardwood and coniferous forests in temperate and boreal regions from 7,500 to 11,000 feet in elevation; however, they are occasionally found below 7,000 feet in winter and during migration. Limited information suggests that the goshawk is a partial migrant, usually moving less than 300 miles (Kennedy 2003). Typical nest areas for goshawks in the northern Rocky Mountains are mature or late-successional coniferous forests, with high canopy closure and clear forest floors on north-facing moderate slopes (Hayward and Escano 1989, Squires and Ruggiero 1996). These stands most often have high (60-90 percent) canopy closure with little understory. Territories are also frequently associated with small openings, typically less than 1 acre (Fitzgerald et al. 1994).

Post-fledging family area and the foraging area typically include a diversity of forest types and conditions including stands of young, mid-aged, mature, and late-successional trees (Reynolds et al. 1992). Prey varies but may include red squirrels, least chipmunk, rabbits, robins, juncos, and northern flying squirrels (Erickson 1987). Snags, downed logs, and woody debris are also important components of the post-fledging family and foraging habitat. Typically, two snags per acre and three downed logs per acre are desired in the ponderosa pine forest type (Reynolds et al. 1992). Nicholoff (2003) recommends three snags per acre for goshawks. DeBlander (2002) estimated 2.7 snags per acre over 11 inches in diameter and estimated 0.3 snags per acre over 19 inches in diameter. Downed logs and woody debris are also an important component of goshawk habitat. Reynolds et al. (1992) suggests three large downed logs per acre (at least eight feet long) in ponderosa pine habitats. Nicholoff (2003) recommends five downed logs per acre at least eight feet long. There are no known historic goshawk nesting territories in the project vicinity. Potential habitat for the northern goshawk occurs across the Catamount Project Area and is likely to occur, particularly in both ponderosa pine and mixed conifer (including limber pine and Douglas-fir) habitats of later successional stages with closed canopy (greater than 40 percent crown cover). Much of the Catamount Project Area provides potential suitable habitat, including 50 percent of ponderosa pine habitat and around 40 percent of mixed conifer habitat.

White-tailed Ptarmigan - Natural History and Distribution

The white-tailed ptarmigan is found primarily in alpine tundra, although it may move below tree line in winter. The species is dependent on willow thickets, especially in winter when snows are deep. In summer they forage on seeds and leaves of herbaceous alpine vegetation, willows, and some insects. Areas that are mostly snow-free early in the season are used for breeding, and females with broods generally occur on rocky wet tundra. Males generally winter above timberline in areas of short willow thickets, while females often winter at or below timberline in taller, denser willow thickets and along willow-dominated watercourses. Threats to the species include events that lead to loss of willow component, usually associated with domestic sheep grazing; use of tundra habitats by livestock, elk; and recreational wilderness users.

This species is found in all alpine regions of Colorado except the Wet Mountains and Spanish Peaks. They were transplanted to Pikes Peak in 1975 (USDA Forest Service 1984). Potential habitat exists in the Catamount Project Area in the alpine environment near treeline, particularly in willow habitat, found in about 1 percent of the Catamount Project Area.

American Marten - Natural History and Distribution

The American marten is mostly a boreal mammal, ranging across Alaska and Canada to Newfoundland and southward at increasingly high elevation along mountain ranges to California and New Mexico. Their range of habitats in Colorado is fairly broad, including tundra rockpiles and talus slopes, as well as montane woodland at elevations of 8,000 to 13,000 feet. Marten are semi-arboreal and can use trees for denning and foraging. Optimum habitat elements appear to be mature and old-growth spruce-fir communities with greater than 30 percent canopy cover, well established understory of fallen logs and stumps, and lush shrub and forb vegetation to support prey (Burnett 1981). Snags and down dead material are important components of denning and foraging habitat. Large logs and other structures provide protection from predators, access to the subnivean (i.e., beneath the snow) space where most winter prey are captured, and protective thermal conditions, especially during winter (Buskirk and Powell 1994). Martens make little use of open clearings without overhead cover (Spencer and Zielinski 1983, Steventon and Major 1982, Buskirk and Powell 1994), but may use riparian areas and meadows (Spencer and Zielinski 1983) and forest edges (Simon 1980). A variety of prey is taken, including squirrels, mice, voles, lagomorphs, shrews, insects, and rarely birds, along with some vegetation (Fitzgerald et al. 1994). The main threats to American martens are habitat fragmentation and timber harvest. Occurrence within the Catamount Project Area is not known. However, suitable habitat for the animal does occur within the Catamount Project Area, particularly in areas with mature spruce-fir forest and mixed conifer (predominantly limber pine and Douglas-fir) forest that has not been burned or logged in the past two decades and where the structure of down dead material is present. In the Catamount Project Area spruce-fir habitat, which is found in approximately 15 percent of the NFS lands in the Catamount Project Area, provides the most suitable habitat, though dense mixed conifer habitat may also be utilized.

Common Hog-nosed Skunk - Natural History and Distribution

Little information exists on the life history or ecology of hog-nosed skunk. Hog-nosed skunks are omnivorous and consume insects, small mammals and reptiles, fruits, berries, and nuts. Hog-nosed skunks are primarily a mammal of Mexico and the southwestern U.S., with records from southeastern Colorado marking the northern

extreme of the species' range. Fitzgerald et al. (1994) identifies the hog-nosed skunk's habitat to be that of rocky canyon country in pinyon-juniper woodlands and montane shrublands of the Southwest; it has also been reported in desert and grassland environments. Colorado records are associated with oakbrush and pinyon-juniper woodland in the southeastern portion of the state. Hog-nosed skunks use rocky ledges, caves, abandoned mines, abandoned burrows, woodrat nests, and similar sites for denning. Threats to the species include degradation, fragmentation, and loss of habitat; interspecific interactions with striped skunks; and grazing (Honeycutt and Dragoo 1995). Occurrence within the Catamount Project Area is not known. However, suitable habitat for the animal does occur within the Catamount Project Area, particularly in Gambel oak habitat and open dry ponderosa pine forest in lower elevations.

Fringed Myotis - Natural History and Distribution

The status and occurrence of the fringed-tailed myotis are not well known in Colorado. Fitzgerald et al. (1994) found that this species is not common in Colorado but is found in ponderosa pine woodlands, greasewood, oakbrush, and saltbush shrublands. Caves, mines, and buildings are used as both day and night roosts. This bat reportedly winters in pinyon-juniper and ponderosa pine habitats. It typically forages over watercourses (USDA Forest Service 1984). Studies in New Mexico found this species roosting in ponderosa pine snags and live ponderosa pine trees with long vertical cracks (Chung-MacCoubrey 1996). These roosts were found in isolated ponderosa pine stands in the drainage bottoms of pinyon-juniper woodlands or at the interface of the ponderosa pine and pinyon-juniper habitats. Snags are also important for roost sites; density of 8 large snags per acre appears to be suitable habitat (Keinath 2004). NDIS data indicate that this species is known to occur but rare in both El Paso and Teller counties (NDIS 2010). Potential habitat for the fringedmyotis occurs in the Catamount Project Area and they are likely to occur. The species has been documented in the forest, but the occurrence in the Catamount Project Area is not known. The Catamount Project Area may provide foraging and roosting habitat for this species.

Rocky Mountain Bighorn Sheep - Natural History and Distribution

The range of Rocky Mountain bighorn sheep includes southern British Columbia and southwest Alberta, south to southeast California, Arizona, and New Mexico (Whitaker 1980). Rocky Mountain bighorn sheep inhabit alpine meadows, foothills, cliffs, and rock outcrops (Luce et al. 1999, Clark and Stromberg 1987). Their diet includes a variety of grasses, forbs, and browse (Luce et al. 1999). Summer habitat is typically at elevations of 9-10,000 feet, while winter range is located in south-facing slopes at elevations of about 7,000 feet (USDA Forest Service 2008). Their current distribution is confined to scattered populations in open or semi-open terrain characterized by a mix of steep or gentle slopes, broken cliffs, rock outcrops, and canyons and their adjacent river benches and mesa tops. Slope steepness appears to be a significant feature of bighorn sheep habitat. They use slopes of 36 to 80 percent in Montana and Colorado, while avoiding slopes less than 20 percent (Beecham and Collins 2007). Bighorn sheep are primarily animals of open habitats, such as alpine meadows, open grasslands, shrub steppe, talus slopes, rock outcrops, and cliffs; in some places, however, they may use areas of deciduous and conifer forests, especially where openings may have been created by clear-cuts or fire (Beecham and Collins 2007). Densely forested areas provide little forage and poor visibility and are rarely used by bighorn sheep (Beecham and Collins 2007). Merwin (2000) noted that bighorn sheep often

selected areas with good visibility within suitable distance of water and escape terrain. Open forests, however, are used in some areas for foraging and thermal cover (Beecham and Collins 2007).

CDOW has mapped habitat areas used by bighorn sheep in the state. According to NDIS data, bighorn sheep are abundant in Teller County and common in El Paso County (NDIS 2010). The Catamount Project Area contains bighorn sheep summer concentration area (4,000 acres), summer range (32,000 acres), winter range (19,000 acres), winter concentration area (8,000 acres), and production (lambing) habitat (14,000 acres) (NDIS 2010).

Two populations of bighorn sheep may utilize the Catamount Project Area. The Pikes Peak population in Game Management Units (GMU) S6 and S46 is a historic population found in the region around Pikes Peak. Population estimates have fluctuated from 30-40 animals in the early 1950's to a modeled estimate of 425 in the mid-1990's. Over the last decade, the population has declined from around 300 animals to 110-120 in 2009 (CDOW 2010b). Disease has been implicated as a possible cause of the recent decline. Winter habitat and critical lambing areas have been mapped for this herd and are located in the southwestern portion of the Catamount Project Area. A migration corridor is also known to exist between the southwestern portion of the Catamount Project Area and Dome Rock State Wildlife Area, though the exact corridor is not well known (CDOW 2010a). The second population at Rampart Range (GMU S-34) is stable and is used as a breeding source to re-populate other bighorn sheep populations across the state of Colorado. This population results from a release of 14 animals in 1946. The peak of the population occurred in the 1990 with 225 animals. Since 1990, the number of sheep has declined to a stable 65 to 70 animals (CDOW 2005 and 2010c).

Project area sheep herds provide both watchable wildlife and hunting opportunities for sportsman. A hunting season has been in place from 1975 to the present. From 1953 to 2009, there has been a total of 487 sheep harvested in S-6 and S-46, and a total of more than 70 animals have been harvested from the S-34 population (CDOW 2005 and 2010c).

The Rampart Range population is of particular interest for this project due to the opportunity to enhance habitat in areas historically used by this population. Rampart Range sheep previously used habitat north of the Queens Canyon Quarry as far north as west of the US Air Force Academy. This included areas around Ormes Peak, Blodgett Peak, Mountain Shadows, and Stanley Canyon. Sheep also previously used the canyons to the southwest of the Queens Canyon Quarry, including Waldo and Williams Canyons. Recently the range utilized by Rampart Range sheep has decreased substantially (CODW 2005).

Threats to the long-term viability of bighorn sheep include diseases transmitted by domestic livestock, the lack of connectivity and loss of genetic variability due to habitat fragmentation, habitat loss, increased human disturbance, competition with domestic livestock, and predation on small, isolated herds. Available sheep habitat in the area is decreasing because of vegetation in advanced succession; increases in Gambel oak habitat and the succession of pinyon-juniper forests have decreased the amount of available forage and visibility, and are thought to be a major factor limiting the distribution of sheep (CODW 2005).

Townsend's Big-eared Bat - Natural History and Distribution

Townsend's big-eared bat is a western species occupying semi-desert shrublands, pinyon-juniper woodlands, and open montane forests. It is frequently associated with caves and abandoned mines for day roosts, hibernacula, or nursery colonies where females root with young during the breeding season. They will also use tree cavities and crevices on rock cliffs for refuge. The bats are relatively sedentary. They do not move long distances from hibernacula to summer roosts nor do they move or forage far from their day roosts (Fitzgerald et al. 1994). Harvey et al. (1999) shows that the majority of Colorado is within the expected distribution of this species, although no large colonies have been found in Colorado.

Population trends are unknown for this species, but it is suspected that they are decreasing due to the susceptibility of the species to human disturbance. There are several documented cases where this species has disappeared as a result of spelunking and other human disturbance in caves and mines (Armstrong et al. 1994).

One subspecies, *Plecotus townsendii pallescens,* occurs over most of the western two-thirds of Colorado and extreme southeastern Colorado to elevations of about 9,500 feet (Fitzgerald et al., 1994). According to NDIS data, this species is uncommon in Teller and El Paso Counties (NDIS 2010). The Colorado Natural Heritage Program database lists locations near Queens Canyon just to the east of the Catamount Project Area near Glen Eyrie. Townsend's big-eared bats have been documented in the Catamount Project Area. A bat gate has been installed at the oil creek tunnel near Pikes Peak Highway to allow protected bat use of this tunnel. Foraging habitat is present throughout the Catamount Project Area.

Northern Wolverine - Natural History and Distribution

The wolverine is a scavenging predator and depends on a diverse ungulate population with a high turnover rate. They can be found in mature and intermediate timbered areas around natural openings, including cliffs, slides, basins, and meadows. Even under optimal habitat conditions, wolverines have low natural densities. They have extremely large home ranges, covering up to 160 square miles in their constant search for carrion. Their habitat use varies seasonally; in summer they favor cooler subalpine and alpine areas. Habitat fragmentation and human disturbance are factors limiting the availability of suitable habitat. In 2008, the USFWS found that the petition to list the North American wolverine that occurs in the contiguous US was not warranted; the USFWS continues to seek new information on biology, ecology and status. In June 2009, a male wolverine, tracked via GPS-satellite collar, was confirmed in the north central part of Colorado – the first confirmed siting in the state since 1911 (CDOW 2009b). Wolverines are considered extirpated from both El Paso and Teller counties (NDIS 2010). There was one unconfirmed sighting of a pair of wolverines from a passenger on a Cog Railway train at the summit of Pikes Peak in August 2004 (USDA Forest Service 2004). This report was not confirmed by the Colorado Division of Wildlife, and it is likely that the animals observed were badgers, which are similar in appearance and common on Pikes Peak. It is unlikely that wolverines occur within the Catamount Project Area.

Northern Leopard Frog - Habitat and Natural History

Northern leopard frogs are found in the northern US and Canada, with additional populations in the higher elevations of the Rocky Mountains (Smith and Keinath 2007). The northern leopard frog occurs in a wide

variety of habitats including creeks, lakes, ephemeral wetlands, and ponds (Smith and Keinath 2007). Breeding habitat is limited to permanent water sources at least 6 inches in depth that do not freeze solid (Baxter and Stone 1985). This species probably breeds in May or June, depending on elevation (Smith and Keinath 2007). Emergent vegetation is important in providing protective cover in ponds and lakes that contain predatory fish (Smith and Keinath 2007). After maturing, sub-adult frogs migrate to suitable feeding sites that are usually adjacent uplands. These dispersal movements may be along riparian corridors or upslope areas. After breeding, adult frogs can be found feeding in upland habitats of grasslands, meadows, and pastures adjacent to breeding areas. Adult frogs are highly mobile, moving at night or when vegetation is wet. They have been found up to two miles from water (Smith and Keinath 2007). Northern leopard frogs overwinter submerged in permanent water that does not freeze solid (Smith and Keinath 2007). Potential risk factors include inadequate regulatory protection of smaller seasonal and semi-permanent ponds, introduced predatory fish, lack of protection at overwintering sites, water quality degradation due to chemicals, loss of migratory pathways, introduced diseases, and road-related mortality. There have been no formal surveys for this species in the Catamount Project Area. Suitable habitat exists in riparian corridors.

3.5.5 Federal Listed & Sensitive Species Environmental Consequences

For each species, effects analysis is provided on the direct and indirect impacts to: (1) habitats; and (2) each specific species. Cumulative impacts are bounded by the Pikes Peak Ranger District and a period of 20 years are also addressed, as is species viability. The analysis and determinations assume that the features listed in *2.3 Design Features* would be implemented. The indicators listed below are used to measure impacts of the project on wildlife and fish habitat:

- Pine structural stage diversity (resulting structural stage distributions);
- Aspen communities (acres enhanced);
- Snag retention (number of snags per acre); and
- Water quality effects (changes to water quantity and quality).

Alternative A (No Action) - Direct and Indirect Effects

Alternative A (No Action) would have no direct effects, as no new actions would occur. Long-term, indirect effects would vary depending on habitat type. In general, Alternative A (No Action) would maintain existing habitat and protect biodiversity in the short-term. Long-Term, the proportion of ponderosa pine cover type in the Catamount Project Area would be expected to rise, as this species continues to encroach into existing open areas and hardwood stands. Early successional habitats would continue to decline as pine stands progress toward later seral stages, which would reduce habitat diversity and not move the forest towards historic conditions. Natural disturbances, such as wildfire, would continue to return portions of the forest in which they occur to early successional stages. Effects for important ecosystems in the Catamount Project Area, as well as the species that may be affected, are described in Table 18.

Table 18. Alternative A – Direct and Indirect Effects to Federal Listed and Sensitive Species Habitat

Habitats Proposed for Treatment	Direct Effects of Alternative A	Indirect Effects of Alternative A	Species Affected
Gambel Oak	None	In the absence of active management, Gambel oak would continue to increase in density and height. This habitat would have a continued risk of wildfire.	Rocky Mountain Bighorn Sheep Common Hog-nosed Skunk Lewis Woodpecker
Aspen	None	In the absence of management, pine encroachment would continue to reduce areas dominated by aspen. Health and vigor of aspen stands would continue to decline.	Flammulated Owl
Ponderosa Pine forest	None	In the absence of active management, additional dense, late-successional stands with closed canopy would develop. The amount of snags is likely to increase with forest succession. These stands would have an increased wildfire risk returning areas to earlier successional stages.	American Three-toed Woodpecker Flammulated Owl Lewis's Woodpecker Northern Goshawk American Marten Fringed Myotis Townsend's Big-eared Bat
Mixed Conifer	None	In the absence of active management, additional dense, late-successional stands with high levels of understory trees would develop. The amount of snags is likely to increase with forest succession. These stands would have an increased risk of insect infestation and wildfire risk, returning areas to earlier successional stages.	Mexican Spotted Owl Boreal Owl Goshawk American Marten Fringed Myotis Townsend's Big-eared Bat Wolverine White-tailed Ptarmigan
Riparian/ Aquatic	None	Stream fragmentation would persist due to existing structures. Water quality would continue to be influenced by ongoing federal/non-federal activities. Drought may continue to reduce stream flows and connectivity.	Preble's Meadow Jumping Mouse Northern Leopard Frog Greenback Cutthroat Trout

There would be no direct effects of Alternative A (No Action) because no new actions are proposed. Indirect and cumulative effects would occur as a response to current conditions in the absence of active management, other than fire-suppression efforts. These effects are discussed below for each species.

Mexican Spotted Owl (Strix occidentalis lucida)

Continuation of fire-suppression policies would be expected to increase both spruce habitat and late-successional pine forest. As stated in the 1995 Recovery Plan, the greatest threats to the MSO and its habitat are catastrophic fire and the continued use of even-aged timber management. Alternative A (No Action) would perpetuate forest succession and hazardous fuel accumulation in the Catamount Project Area. Dense late-successional stands would lead to an increased risk of insect infestation and wildfire. Should a stand-replacing fire occur, critical habitat, protected habitat or restricted habitat could be removed. In the absence of stand-replacing fire, this alternative is likely to produce an increase in late-successional forest habitat, but is not likely to move habitat towards Target/Threshold conditions as defined in the 1995 Recovery Plan.

Preble's Meadow Jumping Mouse (Zapus hudsonius preblei)

This species relies on understory shrubs, grasses, and forbs in riparian areas. Riparian habitat would not be enhanced in this alternative. Assuming a continuation of fire-suppression policies, late-successional pine forest would be expected to increase. Dense late-successional stands would lead to an increased risk of catastrophic wildfire. Wildfire could have negative short-term impacts but would increase understory habitat in the long-term.

Gunnison Prairie Dog (Cynomys gunnisoni)

The GUPD depends on open meadow openings with grass and forbs. Long-term impacts under Alternative A (No Action) include a reduction in meadow habitat as forest succession continues. Threats to the species from plague and predators would continue.

American Peregrine Falcon (Falco peregrinus anatum)

Peregrine falcon are dependent on coniferous forest and riparian foraging habitat adjacent to cliffs. Due to the variety of habitat utilized for foraging, Alternative A (No Action) is not likely to have a significant impact on foraging habitat. Assuming a continuation of fire-suppression policies, late-successional pine forest would be expected to increase. Dense late-successional stands would lead to an increased risk of wildfire. Should a catastrophic wildfire occur, nesting and foraging habitat could be reduced.

American Three-toed Woodpecker (Picoides tridactylus)

American three-toed woodpeckers are associated primarily with spruce habitat's available snags and can also be found in late-successional pine forests and riparian areas. Assuming a continuation of fire-suppression policies, late-successional spruce and pine forest would be expected to increase. Dense late-successional stands would lead to an increased risk of insect infestation and wildfire. Recently burned areas provide optimal habitat for American three-toed woodpeckers in other locations, and burning could provide enhanced habitat. However, current conditions promote high-intensity wildfire and may not promote the optimal conditions for the species. In the absence of stand-replacing fire, this alternative is likely to produce an increase in available habitat for the three-toed woodpecker.

Bald Eagle (Haliaeetus leucocephalus)

No nesting or roosting sites occur within or adjacent to the Catamount Project Area; therefore, no impacts to breeding or roosting are anticipated under Alternative A (No Action). Potential roosting habitat exits in Catamount Project Area forests in later successional states, especially when adjacent to open water. As forest succession continues, increase in mature forests is anticipated. Wildfire and insect outbreaks would continue to return some areas of the forest to early successional stages. In the absence of stand-replacing fire, habitat for the bald eagle is expected to increase.

Boreal Owl (Aegolius funereus)

Boreal owls are associated with mature coniferous forest, particularly spruce-fir forests and lodgepole pine, mixed conifer, Douglas-fir, and aspen interspersed with meadows. Nesting habitat includes mature spruce-fir adjacent to open meadows that provide prey species, especially voles. Nesting habitat typically includes a relatively high density of large trees (10 inches dbh and larger), open understory, and multilayered canopy (Hayward 1997). The boreal owl is a secondary cavity nester that utilizes deserted woodpecker holes or natural cavities in snags with at least 15 inches dbh (Harrison 1979). Under Alternative A (No Action), snags are expected to increase with increased forest density. As forest succession continues, increase in mature forests is anticipated. Wildfire and insect outbreaks would continue to return some areas of the forest to early successional stages. In the absence of stand-replacing fire, habitat for the boreal owl is expected to increase.

Flammulated Owl (Otus flammeolus)

Flammulated owl is dependent on ponderosa pine and spruce in later successional stages. Under this alternative, the continuation of fire-suppression policies is expected to maintain forest succession, leading to an increase in later successional stage acreage. Snags are expected to increase with increased forest density. There are increased risks from high-intensity wildfire with this alternative, which could return areas of the forest in which they occur to early successional stages. In the absence of stand-replacing fire, habitat for the flammulated owl is expected to increase.

Lewis's Woodpecker (Melanerpes lewis)

Lewis's woodpecker depends upon open mature forests with canopy cover less than 40 percent and open old growth stands, oak woodlands, and riparian areas, as well as the availability of snags. Under this alternative, snag availability would likely increase and should not be a limiting factor. Continued forest succession would likely lead to a reduction in open mature stands. There are increased risks from high-intensity wildfire and mountain pine beetle outbreaks with this alternative, which could return areas of the forest in which they occur to early successional stages. In the absence of stand-replacing fire, available habitat for Lewis's woodpecker is likely to decrease under this alternative.

Northern Goshawk (Accipiter gentilis)

Northern goshawk requires mature forest with canopy cover greater than 40 percent and areas at least 50 acres in size for nesting habitat. Under this alternative, continued forest succession would lead to an increase in forest density. Over time, some stands would become too dense for nesting, while others would mature to provide optimal nesting conditions (Greenwald et al. 2005). Foraging habitat is more varied and may include

openings, forest edges, and open canopy stands. Some open foraging habitat may decrease as forest openings are reduced due to pine encroachment. The risk of high-intensity fire increases with this alternative. Stand-replacing fire has the potential to destroy nest trees and other habitat area. Overall, in the absence of stand-replacing fire, nesting habitat is likely to increase, while diversity of foraging habitat decreases under this alternative.

White-tailed Ptarmigan (Lagopus leucura)

This species is associated with the alpine and sub-alpine environment, especially in habitat with deciduous shrubs. Under Alternative A (No Action), the risks of stand-replacing wildfire would increase in forests in the sub-alpine zone.

American Marten (Martes americana)

The American marten depends on dense mature and old growth stands with woody debris and greater than 50 percent cover. Under the absence of active management, forest succession would likely continue, resulting in increased canopy cover and density of the forest. This change would likely benefit marten by increasing denning and foraging habitat. Prey associated with closed forest conditions is also likely to increase. The risk of high-intensity fire and pine beetle outbreaks increases with this alternative. If stand-replacing fire occurs, some optimal habitat may be destroyed. In the absence of stand-replacing events, habitat for marten is likely to increase under this alternative.

Common Hog-nosed Skunk (Conepatus leuconotus)

This species is typically found in montane shrublands such as the Gambel oak habitat found in portions of the Catamount Project Area. Long-term impacts under Alternative A (No Action) would include a reduction in foraging habitat as forest succession continues. The risk of crown fire in Gambel oak is also increased in this alternative. Habitat quantity and quality for hog-nosed skunk are expected to decrease under this alternative.

Fringed Myotis (Myotis thysanodes pahasapensis) and Townsend's Big-eared Bat (Plecotus townsendii)

These bat species rely on the availability of snags, rocks, caves, or mines for roosting and on a variety of forest habitats for foraging. The continuation of forest succession and fire suppression would limit foraging opportunities by creating dense forests and decreasing hardwood habitats in riparian areas. Roosting habitat in snags is likely to increase with forest succession and the absence of active management. There are also increased risks from wildfire outbreaks under this alternative. Wildfire at lower intensity levels could lead to an increase in snags, but current conditions favor high-intensity, stand-replacing events that would not benefit these species. In the absence of high-intensity fire, diversity of foraging habitat is likely to decrease, and roosting habitat would likely increase, under this alternative.

Rocky Mountain Bighorn Sheep (Ovis canadensis canadensis)

Bighorn sheep depend on open areas for high visibly and access to escape cover for foraging. Long-term impacts under Alternative A (No Action) would include a reduction in foraging habitat as forest succession

continues. Thermal cover for winter habitat would increase under this alternative with forest succession, but this habitat is not a limiting factor in the Catamount Project Area.

Northern Wolverine (Gulo gulo)

Under Alternative A (No Action), ungulate prey population may decrease with decreased forage availability as forest succession continues. Human disturbance and habitat fragmentation would continue to limit suitable habitat for wolverine under Alternative A (No Action).

Northern Leopard Frog (Rana pipiens)

Under Alternative A (No Action), water quality would continue to be negatively impacted by existing sources of pollution and sedimentation. Predation threats from non-native fishes would also continue to negatively impact leopard frogs. The likelihood of high-intensity fire increases under this alternative. Should a high-intensity fire occur, water quality and riparian habitat would likely be negatively affected due to reduction of cover and increased erosion and sedimentation. Overall, effects on habitat quality would continue to have a negative impact on the northern leopard frog.

Alternative A (No Action) - Cumulative Effects

Under Alternative A (No Action), there would be no additional vegetation treatments on NFS lands in the Catamount Project Area. While the recent and on-going vegetation treatments on private lands within the Catamount Project Area, as discussed above, would help to reduce stand densities and create a more diverse landscape, NFS lands account for more than 65 percent of the Catamount Project Area and 80 percent of the forested area. Without any treatments on these lands, a large portion of the Catamount Project Area would be characterized by dense stands of ponderosa pine and mixed conifer. As a result, MSO habitat would not move towards target conditions, and conifer encroachment would continue to pose a risk for meadow and riparian habitat, impacting Gunnison prairie dog and Preble's meadow jumping mouse, respectively. The increased risk of intense wildfire could negatively impact all species by reducing habitat quantity or quality and by increasing the likelihood of erosion into greenback cutthroat trout streams. The cumulative effect of the past, present, and reasonably foreseeable future actions on the condition of the forest vegetation in the Catamount Project Area under Alternative A (No Action) would be an area dominated by forest stands that are generally healthy but relatively homogenous in age and structure and increasingly at risk to insects, disease, and wildfire.

Alternative B (Proposed Action) - Direct and Indirect Effects

Alternative B (Proposed Action) is designed to move the forest towards historical forest conditions and reduce wildfire hazards, while improving health of ponderosa pine and Douglas-fir dominated forest types. In general, there would be short-term impacts to wildlife habitat availability during treatments; however, over the long-term, there would be improved quantity, diversity, and quality of habitat as decreased risk of habitat loss due to stand-replacing wildfire.

As a result of treatment, the conifer forest would be slightly reduced in the Catamount Project Area. There would be an increase in the diversity of understory plants within many conifer stands due to reduced forest canopy cover and disturbance caused by thinning and prescribed fire. In addition, cutting of diseased trees may

occur in limited sites. These treatments would open up these stands and reduce the risk of disease spread. Treatment of aspen stands would remove diseased trees and reduce conifer competition, thereby improving health and vigor. Disturbance created by prescribed fire would also help stimulate the regeneration of the less shade-tolerant plant species within these stands. Treatments would also improve the diversity in structural stages as displayed in Tables 8, Structural Stage Objectives for Forested Treatment Areas under Alternative B (Proposed Action), bringing the Catamount Project Area closer to historic conditions. Effects to habitats are provided Figures 8, 9 and 10. Alternative B (Proposed Action) would move the Catamount Project Area closer to historic forest conditions. Effects to habitats are displayed on Table 19.

Table 19. Alternative B – Direct and Indirect Effects to Federal Listed and Sensitive Species Habitat

Habitat	Direct Effects for Action Alternative	Indirect Effects for Action Alternative	Species Potentially Impacted
Gambel Oak	Reduction in density and crown cover in Gambel oak habitat.	Enhancement of oak habitat for grazers and other wildlife.	Rocky Mountain Bighorn Sheep Common Hog-nosed Skunk Lewis's Woodpecker
Aspen	Removal of competing conifers and cutting of aspen to encourage new growth. Removal of diseased aspen to propagate new suckers.	Improved health and vigor of aspen stands.	Flammulated Owl Goshawk
Dry Ponderosa Pine Forest	Opening up of canopy. Creation of forest openings of 1 to 40 acres by thinning and prescribed burn.	Movement towards historical forest conditions. Reduction of dense mature habitat type and crown cover. Decreased likelihood of catastrophic fire.	American Three-toed Woodpecker Flammulated Owl Lewis's Woodpecker Northern Goshawk American Marten Fringed Myotis Townsend's Big-eared Bat
Mesic Ponderosa Pine Forest	Opening up of canopy. Creation of forest openings of 1 to 40 acres by thinning and prescribed burn.	Movement towards historical forest conditions. Reduction of dense mature habitat type and crown cover. Decreased likelihood of catastrophic fire.	American Three-toed Woodpecker Flammulated Owl Lewis's Woodpecker Northern Goshawk American Marten Fringed Myotis Townsend's Big-eared Bat
Mixed Conifer	Opening up of canopy. Creation of forest openings of 1 to 40 acres by thinning and prescribed burn.	Movement towards historical forest conditions. Decreased likelihood of catastrophic fire.	Mexican Spotted Owl Boreal Owl Goshawk American Marten Fringed Myotis and Townsend Big-eared Bat Wolverine White-tailed Ptarmigan
Riparian/Aquatic	Potential for short-term impacts to aquatic habitat from sedimentation during treatment activities.	Decreased likelihood of catastrophic fire and the resultant bank erosion and sedimentation.	Preble's Meadow Jumping Mouse Northern Leopard Frog Greenback Cutthroat Trout

Mexican Spotted Owl (Strix occidentalis lucida)

No MSO have been recorded or observed in the Catamount Project Area. The Catamount Project Area is within designated critical habitat, protected areas outside of PACs, and restricted habitat, as defined by the 1995 Spotted Owl Recovery Plan. As previously noted, however, there are some areas within the critical habitat boundaries that do not and cannot support the primary constituent elements and are, by definition, not considered to be critical habitat, even though they are within the identified mapped boundaries. Prior to project implementation, USDA Forest Service biologists, in coordination with USFWS, would review proposed sites to determine if they provide suitable MSO habitat, and to determine appropriate mitigation measures and survey requirements if potential habitat is present. Due to these measures, the possibility of direct injury, mortality, or disturbance of individual MSOs as a result of the action alternative would be minimized.

Long-Term, Alternative B (Proposed Action) would directly address the two primary threats the MSO: catastrophic wildfire and even-aged management. Fuel reduction and prescribed burn treatments on up to 7,600 acres of mixed conifer habitat would reduce the hazardous fuel loads and the likelihood of catastrophic wildfire in habitats suitable for MSO, including designated Critical Habitat, Protected Habitat, and Restricted Habitat areas. In addition, thinning treatments and prescribed burns would create small openings and thinned stands that increase horizontal diversity and create snags, canopy gaps, and large logs, as well as perpetuate understory shrubs, grasses, and forbs, which are important habitat components to the owl, its prey, and other wildlife (USFWS 1995). While Alternative B (Proposed Action) could reduce forest cover in the short-term, treatments would move stand conditions towards target levels in the long-term.

Catamount Project Area design criteria provide protection for potential MSO habitat during treatment activities (*2.3.3 Fish and Wildlife Protection*). The majority of MSO Protected Habitat in the Catamount Project Area is excluded from mechanical thinning and harvest treatments that utilize heavy equipment or machinery because of the slope constraints of prohibiting harvesting equipment on slopes greater than 35 percent unless the contractor can demonstrate the ability to remove logs without environmental damage, such as excessive soil disturbance as discussed in Section 2, Project Description. MSO habitat-protection measures, including survey requirements, are incorporated into the project design criteria for fish and wildlife (*2.3.3 Fish and Wildlife Protection*). Specifically, all MSO protected habitat areas would be excluded from all treatments, except prescribed fire and hand thinning activities. Pre-fire mechanical preparation may occur through hand thinning operations if site conditions permit, but would not exceed the 9-inch dbh criteria as specified in the 1995 Recovery Plan guidelines (USFWS 1995). In restricted habitat, design criteria would promote the retention of large trees. Trees over 24-inches dbh would be retained unless they are a threat to human safety or property. In addition, all trees and snags over 18-inches dbh would be retained unless removal is necessary to remove the risk of catastrophic wildfire in MSO habitat.

Overall, Alternative B (Proposed Action) would result in long-term beneficial effects to the MSO and protected, restricted, and critical habitat. Treatment activities would enhance and promote the habitat features essential for the conservation of the MSO. The treatments proposed are consistent with the 1995 Recovery Plan guidelines for fuels and forest management practices in MSO habitat. Although treatment activities may temporarily convert some suitable habitat areas to unsuitable nesting or roosting habitat, the overall result would mimic natural processes and would introduce additional diversity into the forest structure, as well as move stands towards target stand conditions identified in the Recovery Plan (USFWS 1995). Assuming project design criteria are implemented, Alternative B (Proposed Action) would have no long-term adverse impacts on the MSO.

Preble's Meadow Jumping Mouse (Zapus hudsonius preblei)

Direct impacts include the slight potential for individual mortality due to fuel reduction treatments in or near Catamount Project Area riparian areas and floodplains. Thinning treatments may also have short-term negative impacts by reducing hiding cover. Long-term impacts would likely increase habitat available for the species. Thinning of conifers would lead to the development and expansion of hardwood stands and grasslands in riparian areas, therefore providing additional habitat.

The effects of management activities upon riparian areas would be mitigated through a wide variety of standards and guidelines, as well as BMPs and WIZ protection measures. These standards and guidelines would be met in the Catamount Project Area through the use of specific design criteria (*2.3 Design Features*). If these standards and guidelines are met throughout the Catamount Project Area, then no adverse impacts to the Preble's meadow jumping mouse are anticipated under Alternative B (Proposed Action).

Gunnison Prairie Dog (Cynomys gunnisoni)

Direct impacts to Gunnison prairie dog include the slight potential for displacement due to project activities. No colonies are known to occur on NFS lands in the Catamount Project Areal. There is some potential for changes to habitat due to broadcast burning to create and maintain openings within ponderosa pine, Gambel oak, aspen and mixed conifer habitat. Proposed prescribed burn treatments would not specifically target current meadow habitat, therefore, impacts would be minimal. Long-term impacts include the potential for increased suitable habitat, as conifer encroachment into open meadows would be reduced.

American Peregrine Falcon (Falco peregrines anatum)

Direct effects to the peregrine falcon would include a small potential for individual displacement during thinning and prescribed burn treatment activities, particularly from smoke and noise disturbance. Indirect effects to this species are likely minimal, as thinning and burning would not affect cliff nesting habitat. Should active eyries be encountered, work in the area would stop until the USDA Forest Service biologist determined the necessary mitigation measures. In addition, project design criteria would provide recommended timing limitations for disturbance around active eyries (JW Associates 2010f). Long-Term, foraging habitat would likely increase as forest canopy cover is decreased and forest openings increased under Alternative B (Proposed Action).

American Three-toed Woodpecker (Picoides tridactylus)

Direct effects to the three-toed woodpecker would include a small potential for individual mortality due to tree felling. The three-toed woodpecker could be negatively impacted by management activities in spruce-fir habitat. Some snags may be lost due to timber harvest activities. However, Forest Plan snag-retention standards would be met in the Catamount Project Area through the use of specific design criteria (*2.3.3 Fish and Wildlife Protection*). Overall, spruce-dominated stands and snags would be preserved if design criteria are followed.

Bald Eagle (Haliaeetus leucocephalus)

Some short-term effects may occur because migrating or wintering birds are likely to avoid the area during timber harvest or prescribed burn activities. No known nesting or roosting sites occur in or adjacent to the Catamount Project Area; therefore, no impacts to breeding or roosting habitat are anticipated under Alternative B (Proposed Action). The primary winter food source, deer carrion, would continue to be available. Habitat conditions for deer across the Pike and San Isabel National Forest are likely to remain stable or improve, and management activities proposed for the Catamount Project Area would enhance deer habitat and may further increase deer numbers, benefiting the bald eagle. Should any bald eagle nests be discovered, Catamount Project Area design criteria (*2.3.3 Fish and Wildlife Protection*) would provide protection and minimize disturbance of nests.

Boreal Owl (Aegolius funereus)

Direct effects to the boreal owl would include limited potential for individual mortality due to tree felling or other treatments. Indirect impacts include changes to mature coniferous forest and aspen habitat conditions. Boreal owls are associated with mature conifer forest, particularly spruce-fir forests near open meadows. Overall, the acreage of spruce under Alternative B (Proposed Action) could be reduced slightly, particularly in ecotones where pine and spruce come together. Boreal owl may also utilize mixed conifer forest. In Alternative B (Proposed Action), up to 7,600 acres of mixed conifer forest are proposed for treatment. Proposed treatments would create more open stand conditions, reducing mature habitat with crown cover over 40 percent. In Alternative B (Proposed Action), meadows adjacent to conifer habitat, which are used for foraging, are likely to increase. Thinning and prescribed burning would create small openings from 1 to 40 acres in size, with most less than 10 acres. This treatment would increase potential foraging habitat in the long-term.

Boreal owl depend on snags for nesting. Some snags may be lost due to harvest activities and prescribed fires, but the fires may also create some snags. Forest Plan snag-retention standards of 20-30 snags per 10 acres would be met in the Catamount Project Area through the use of specific design criteria (*2.3.3 Fish and Wildlife Protection*). Overall, long-term impacts to boreal owl may include a slight reduction of nesting habitat and an increase in foraging habitat for this species.

Flammulated Owl (Otus flammeolus)

Direct effects to the flammulated owl would include limited potential for individual mortality due to tree felling or other treatments. Indirect impacts may occur due to changes in habitat. The flammulated owl appears to be a habitat specialist with low fertility (small clutch size), which is generally an adaptation to a stable environment (Hayward and Verner 1994). Therefore, the flammulated owl would be sensitive to habitat modification. The mature mixed conifer habitat would become less dense in treated areas in the Catamount Project Area. However, these more open conditions would reduce the extent and intensity of a potential catastrophic fire in mature mixed conifer habitat. Changes in the distribution and size of snags (potential nest trees) would also be important. Some reductions in snags may occur under Alternative B (Proposed Action) due to project activities, including prescribed fire. However, Forest Plan guidelines, which are incorporated into Catamount Project Area design criteria, require retention of 20 to 30 snags per 10 acres. Overall, long-term impacts to flammulated owl may include to a slight reduction of mature mixed conifer habitat but a

corresponding increase in habitat stability due to the reduction in the extent and intensity of a potential catastrophic fire in this habitat type.

Lewis's Woodpecker (Melanerpes lewis)

Direct effects to Lewis's woodpecker would include the limited potential for individual mortality due to tree felling and other treatments. Indirect effects include long-term increases in preferred habitat of open canopied mature pine from thinning and use of prescribed fire. Under Alternative B (Proposed Action), suitable habitat in mature structural stage ponderosa pine habitat with open canopy (less than 40 percent crown cover) is likely to increase for both the dry and mesic forest type in the long-term. Changes in the distribution and size of snags (potential nest trees) could also be important. Some reductions in snags may occur under Alternative B (Proposed Action) due to project activities, including prescribed fire. However, Forest Plan guidelines, which are incorporated into Catamount Project Area design criteria (*2.3.3 Fish and Wildlife Protection*), require retention of 20 to 30 snags per 10 acres.

Northern Goshawk (Accipiter gentilis)

No goshawk nests have been detected in the Catamount Project Area; however, suitable habitat does exist and surveys have not been conducted in the area. Direct impacts to northern goshawks include the limited potential for loss of unknown active nests due to tree felling or prescribed fire. However, pre-treatment surveys required by design criteria (*2.3.3 Fish and Wildlife Protection*) would limit these risks. Design criteria would also minimize project activities during the migratory bird nesting/breeding season. Those limitations would reduce the likelihood of direct impacts to goshawks since their nesting season dates are similar to that for migratory birds, with the exception of goshawks generally returning to nesting territories earlier (March and early April) than May 1. Due to snow conditions and limited early spring access in the Catamount Project Area before May 1, it is unlikely that project activities would occur during the early part of goshawk breeding season. The most likely direct effects on goshawks would be disturbance by project activities. Pre-treatment surveys would be conducted for goshawk nests. Should active goshawk nests be discovered, work would stop until a USDA Forest Service biologist determines what potential impacts and mitigation measures are required.

Other long-term indirect effects include a reduction in potential goshawk habitat. Moderately dense mature forest habitat (mature greater than 40 percent crown cover) contributes to nesting and some forage habitat. This habitat type would likely decrease in the Catamount Project Area for ponderosa pine and mixed conifer forests (JW Associates 2010b). The impact on the overall habitat available in the Forest, however, would be minor. Although goshawks are not cavity-dependent species, they depend on cavity nesters that may use snags as prey. Under this alternative, some snags could be lost during management activities. However, Forest Plan guidelines, which are incorporated into Catamount Project Area design criteria (*2.3.3 Fish and Wildlife Protection*), require retention of 20 to 30 snags per 10 acres.

White-tailed Ptarmigan (Lagopus leucura)

Direct effects to white-tailed ptarmigan would include a limited potential for individual mortality during fuel break treatments should they occur near treeline. Indirect impacts would likely be limited to habitat changes resulting from fuel break treatments. Impacts would be limited, as the preferred habitat for the ptarmigan is at

higher elevations than the majority of the proposed treatments. There is a limited possibility for habitat change due to thinning and prescribed burn treatments in the upper portions of the mixed conifer habitat, which may be utilized as winter habitat for ptarmigan.

American Marten (Martes Americana)

Direct effects to marten would include a limited potential for individual mortality due to tree felling and other treatments. Indirect, long-term effects would include a loss of potential habitat due to management activities. American martens are closely associated with dense, mature and old growth conifer stands, and actions that modify these stands may modify marten distribution and abundance.

The impacts of treatment activities in potential marten habitat would be mitigated by Catamount Project Area design criteria. Alternative B (Proposed Action) restricts the size of openings to 40 acres. This is important because marten appear to require large expanses of contiguous forest, and large openings could fragment habitat. Mature ponderosa pine stands with moderate or high canopy cover (mature greater than 40 percent canopy cover) may be used by marten, particularly in the mesic forest type. This habitat type is expected to decrease in the Catamount Project Area from 38 to 10 percent of the mesic forest type. Spruce-fir forest that represents the preferred habitat for marten would not be targeted for treatment in Alternative B (Proposed Action).

Prescribed burning and other fuel mitigation activities could reduce ground cover, which is an important component of marten habitat for thermal regulation in the winter months and also provides habitat for marten prey. Project design criteria (*2.3.3 Fish and Wildlife Protection*) were developed to provide downed woody debris.

Common Hog-nosed Skunk (Conepatus leuconotus)

Direct impacts on hog-nosed skunk would include the limited potential for individual mortality, disturbance, or displacement due to thinning and prescribed fires. Indirect effects would likely be positive due to treatments in Gambel oak habitat on up to 1,400 acres. These treatments would be conducted to thin or remove Gambel oak and stimulate grass and other ground cover, thereby enhancing habitat for the hog-nosed skunk in the long-term.

Fringed Myotis (Myotis thysanodes pahasapensis) and Townsend's Big-eared Bat (Plecotus townsendii)

Direct impacts on bats would include the limited potential for individual mortality, disturbance, or displacement due to tree felling and prescribed fires as well as the loss of roosting habitat due to the reduction of suitable roost snags if they are removed due to safety concerns. Effect of management activities on snags would be mitigated by Forest Plan guidelines, which are incorporated into Catamount Project Area design criteria and provide for minimum number and size of snags to be retained.

Foraging habitat for bats would most likely improve under Alternative B (Proposed Action) through opening of pine stands. Insect populations could increase after prescribed fires (Cerovski 2002), logging, and thinning (Dykstra et al. 1999), therefore increasing available bat prey.

Due to limited surveys, the importance of the Catamount Project Area as hibernacula or maternity roosting sites is not known. No hibernacua or roosting sites have been discovered, but suitable habitat may exist. Should any sites be discovered in the Catamount Project Area, USDA Forest Service biologists would be notified and work in the area stopped until the appropriate mitigation is determined.

Rocky Mountain Bighorn Sheep (Ovis canadensis canadensis)

Direct impacts on bighorn sheep would include the limited potential for disturbance during treatments in the Catamount Project Area. Indirect effects would most likely be positive, as treatments in Gambel oak habitat in up to 1,500 acres in the Catamount Project Area would enhance habitat for bighorn sheep. These treatments would increase forage availability and decrease the height of oak, allowing for better horizontal visibility so that sheep can to more easily view and avoid approaching predators. Due to the location of the majority of the Gambel oak habitat in the Catamount Project Area, treatments may specifically provide habitat enhancement for the Rampart heard, as the Catamount Project Area was historical habitat for this herd. Treatments in conifer habitat may also increase potential habitat for this species; treatments in ponderosa pine habitat would provide openings of 1 to 40 acres in size, which would offer better forage and increase the potential for horizontal visibility. The USDA Forest Service is working with CDOW to implement management actions that would enhance bighorn sheep habitat while meeting the purpose of and need for this project.

Northern Wolverine (Gulo gulo)

Due to the likely local extirpation of the northern wolverine, no direct impacts are anticipated from Alternative B (Proposed Action). Indirect impacts include habitat changes to potential habitat in coniferous forest and changes that would impact habitat for ungulate prey species. Due to the large habitat size and variety of habitat used by this species, Alternative B (Proposed Action) is not likely to impact the wolverine.

Northern Leopard Frog (Rana pipiens)

Potential direct effects to northern leopard frog include individual mortality of eggs, larvae, and adult frogs due to treatments or stream crossings in riparian areas. No new system roads are proposed for construction. If temporary roads or stream crossings are required, construction could negatively impact leopard frogs by displacing or compacting soils and removing or disturbing ground litter. Reductions in downed woody material due to prescribed burning activities would also negatively impact leopard frogs by reducing cover. Effects would be minimized by use of Forest Plan standards and guidelines for riparian areas that would be met in the Catamount Project Area through the use specific design criteria.

Alternative B (Proposed Action) - Cumulative Effects

Hazardous fuels-reduction treatments have been completed and are being planned on state and other public lands within the mixed conifer forests throughout the Catamount Project Area to reduce the risk of catastrophic fires. Specifically, vegetation treatments have been implemented on lands managed by Colorado Springs Utilities within the Catamount Project Area. On-going and future foreseeable treatments on these lands include the following:

- proposed forest thinning projects of up to 700 acres, primarily Engelmann spruce, mixed conifer and some aspen;

- prescribed fire on up to 280 acres of area previously thinned; and
- commercial timber harvest on up to 600 acres, primarily spruce-fir.

Additional fuel hazard reduction treatments may also be implemented as a result of several Community Wildfire Protection Plans that have been developed for communities within the area. These include the Ute Pass Community Wildfire Protection Plan and the Teller County Community Wildfire Protection Plan. These treatments would be primarily within the wildland-urban interface and treat areas at the lower elevations, most likely within the ponderosa pine, Gambel oak, and Douglas-fir cover types. These treatments may have short-term cumulative impacts on threatened and endangered species by disturbing animals and fragmenting habitat. Long-term impacts would be positive, as the extent and intensity of catastrophic fires would be reduced.

Future non-federal activities reasonably likely to occur also include rural subdivision development, road construction and maintenance, power line development and maintenance, and motorized and non-motorized recreational activities Most of the above activities are currently causing effects, as described in the environmental baseline condition.

In addition to impacts on private lands, above, reasonably foreseeable future activities in and near the Catamount Project Area consist primarily of treatments include vegetation treatments recently implemented on several thousand acres of NFS lands as part of the Trout West project. Vegetation treatments included thinning, creating openings, and prescribed burning. These treatments were primarily within the ponderosa pine and Douglas-fir cover types. Forests within these recently treated areas are less dense and have more openings than what generally exists within the Catamount Project Area.

The overall cumulative effect of Alternative B (Proposed Action) and these other projects would be to reduce the extent and intensity of catastrophic fire and its impact on threatened and endangered species and their habitat in the Catamount Project Area. The treatment areas proposed for the Catamount project represent about 90 percent of the montane forest on NFS lands within the Catamount Project Area, but account for only 20 percent of the entire Catamount Project Area. These on-going and future treatments in adjacent areas would have a long-term positive cumulative effect on the habitat for the threatened, endangered, and proposed species likely to occur in the Catamount Project Area by: 1) reducing the extent and intensity of a wildfire or beetle infestation developing in adjacent areas; and 2) reducing stand density in the area to return to historical conditions.

Additional specific impacts by species include the following:

Mexican Spotted Owl

As stated in the 1995 Recovery Plan, the greatest threat to the MSO and its habitat is catastrophic fire and the continued use of even-aged timber management. Hazardous fuels-reduction treatments on non-federal lands would reduce the extent and intensity of catastrophic fires, resulting in long-term beneficial cumulative effects to the MSO and its preferred habitat. Potential benefits would vary from minor to moderate, depending on the known occurrences of the species in or near the proposed treatment areas and/or the presence protected, restricted, or critical habitat. The preferred habitat for MSO is typically characterized by steep, rocky slopes that are unsuitable for residential or other developed uses. As such, developed uses are unlikely to contribute to cumulative effects to the MSO or its preferred habitat.

Preble's Meadow Jumping Mouse

Preble's meadow jumping mouse could be impacted by activities that effect riparian areas, similar to those described for greenback cutthroat trout, above. Potential effects could vary from minor to moderate, depending on the known occurrences of the species in or near the proposed treatment areas or the area of affected habitat.

Gunnison Prairie Dog

In addition to the forestry cumulative impacts described above, Gunnison prairie dog has the potential to be impacted by activities in open meadows, including grazing and agriculture. Levels of activity are likely to be similar as described for the affected environment. Potential effects could vary from minor to moderate, depending on the known occurrences of the species in or near the proposed treatment areas or the area of affected habitat.

3.6 Recreation/Visuals

Recreation/Visuals is divided into two sections; Recreation and Visual Resources. The discussion is summarized from the Catamount Forest Health & Hazardous Fuels Reduction Project Recreation Specialist Report (JW Associates 2010g) and Catamount Forest Health & Hazardous Fuels Reduction Project Visuals Specialist Report (JW Associates 2010h).

3.6.1 Recreation Affected Environment

The Catamount Project Area is located within the Pikes Peak Ranger District of the Pike and San Isabel National Forest. The Catamount Project Area includes approximately 98,760 acres of land, of which about 69,800 acres are NFS lands. The remaining lands are a mix of public and private ownership and include multiple reservoirs and associated lands that are owned and operated by Colorado Springs Utilities. Other land owners within the Catamount Project Area include the communities of Manitou Springs, Cascade, Crystola, Chipita Park, and Green Mountain Falls, as well as individual (residential) landowners along the Highway 24 corridor and scattered in-holdings within national forest boundaries.

The primary public access routes to and within the Catamount Project Area include the following:

- **Rampart Range Road** – generally located along the northeastern boundary of the Catamount Project Area
- **State Highway 24** – generally parallels the northeastern boundary of the Catamount Project Area between Colorado Springs and Woodland Park
- **High Drive** – provides access to the popular Jones Park and Bear Creek trail systems from the City of Colorado Springs
- **Highway 67** – generally located along the western boundary of the Catamount Project Area,
- **Fourmile Creek Road** – provides access via Highway 67 into developed and dispersed camping sites in the Crags area,

- **Gold Camp Road (370)** – provides an east-west connection along the southern boundary of the Catamount Project Area between Colorado Springs and Victor/Cripple Creek. An Environmental Impact Statement was completed in 2005 to reopen Tunnel #3, however the decision was appealed and remanded, so it remains closed, and
- **Pikes Peak Highway (334)** – which is a heavily used toll road that leaves Highway 24 at Cascade and provides vehicular access to the summit of Pikes Peak and the Cog Railway.

Access to the remainder of the Catamount Project Area is via a combination of classified and unclassified forest system roads, as well as a number of private roads that are largely closed to public access.

Private, non-NFS lands within the Catamount Project Area are primarily owned and managed by Colorado Springs Utilities (CSU). CSU manages 11 reservoirs in the Catamount Project Area that contribute to the municipal water supply for Colorado Springs. Three of these reservoirs (North and South Catamount reservoirs and Crystal Reservoir) are located within the Pikes Peak North Slope Recreation Area and are open to public use. The other eight reservoirs are located within the Pikes Peak South Slope Recreation area. Only one of the reservoirs (Rosemont) in this area is currently open to public use.

Within the Catamount Project Area, the primary recreational activities include hiking, biking, backcountry and nordic skiing, camping, hunting, fishing, and off-highway vehicle (OHV) use, shooting, and sightseeing, among others. Outfitted and guided activities include rock climbing, hiking, backpacking, jeep tours, avalanche clinics, snowshoeing, backcountry skiing, mountain bike tours, and horse trail rides. The 2006 National Visitor Use Monitoring (NVUM) process estimated that there were approximately 4,446,300 national forest visits to the Pike and San Isabel National Forest during the 2005-2006 sampling timeframe (USDA Forest Service 2006b). Catamount Project Area-specific visitor use estimates are not available in the NVUM results, though recreational use likely accounts for about 600,000 visitors per year in the Catamount Project Area, with most of this use attributed to the Pikes Peak Highway, Cog Railroad, and Barr Trail.

Developed Recreation

Campgrounds

There are many campgrounds in and around the Catamount Project Area, including several USDA Forest Service and other public and private campgrounds. Within the Catamount Project Area there are three developed Forest Service campgrounds, including: the Crags Campground, Wye Campground, and Barr Camp. In addition to these campgrounds, two USDA Forest Service-permitted facilities, the Emerald Valley Ranch and Bear Trap Ranch, also provide overnight recreational opportunities within the southern portion the Catamount Project Area.

Day Use Areas

As with campgrounds, there are many day use areas in the Catamount Project Area vicinity. Within the Catamount Project Area boundary, the USDA Forest Service provides multiple day use areas (picnic grounds), many of which are along the Pikes Peak Highway. Day use areas/picnic grounds include the following; Crowe Gulch, Crystal Reservoir Visitor Center, Halfway Picnic Grounds and Glen Cove. Each of these sites provides parking, picnic tables, and restrooms for visitors. The USDA Forest Service capacity at the Crowe Gulch,

Halfway, and Glen Cove picnic grounds is 15, 135, and 35 PAOT, respectively (USDA Forest Service 2007b). There are several other parking/scenic viewpoints along the Pikes Peak Highway, as well as a concessionaire-operated food/gift shop at the summit. The capacity at the summit is estimated to be 252 PAOT (USDA Forest Service 2007b).

The Pikes Peak Highway also provides access to day use opportunities at and around CSU's three reservoirs in the North Slope Recreation Area. Common day use activities at these reservoirs include hiking, biking, fishing, picnicking, and boating. Swimming, camping, and the use of gasoline-powered boats are prohibited. In the South Slope Recreation Area and along the southern extent of the Catamount Project Area, CSU provides limited day use opportunities (primarily fishing) at its Penrose-Rosemont Reservoir. Public access in the South Slope area may change following completion of the CSU public access plan.

Trails

There are approximately 76 miles of recognized, USDA Forest Service "system" trails in the Catamount Project Area. These trails provide both motorized and non-motorized opportunities and include the following (USDA Forest Service 2010d):

- Barr Trail
- Jones Park Trail
- Bear Creek Trail
- 7 Bridges Trail
- Penrose Trail
- Pipeline Trail
- Foresters Trail
- St. Mary's Falls Trail
- Crags Trail
- Horsethief Park Trail
- Severy Creek Trail

Many of the trails listed above are segments on or maybe accessed via the Ring the Peak trail system. The Ring the Peak Trail is a trail system of nonmotorized and motorized trails that partially circumnavigate Pikes Peak. Portions of the trail may be used by motorized users. A route on the southwest slope of Pikes Peak to complete the trail system has not been proposed or determined.

Other Uses

The Pikes Peak Highway and Cog Railway are two of the most heavily used recreation facilities in the Catamount Project Area. It is estimated that about 500,000 visitors use these facilities annually. The Pikes Peak Highway is a 19-mile roadway that provides vehicular access from Cascade to the summit of Pikes Peak. The roadway is partially paved and is open to public use year-round, weather permitting. Visitors pay a per-person fee for driving along the Pikes Peak Highway. In addition to the scenic opportunities available along the roadway, other recreational opportunities include hiking, picnicking, wildlife viewing, boating (self-

propelled, non-gasoline boats) and fishing on Crystal Creek Reservoir, and snowshoeing, among others (Colorado Springs 2010).

The Pikes Peak Highway also serves as the course for the Pikes Peak International Hill Climb. Held annually in June, this motorized road race is the second oldest motor sports race in the country (it was first held in 1916). The motorized race includes 11 automotive classes and attracts about 200 participants, as well as thousands of spectators (Pikes Peak International Hill Climb 2010).

The Pikes Peak Cog Railway was originally constructed in 1891 and provides rail access from Manitou Springs to the summit of Pikes Peak. The approximately 9 mile railway is open year-round, weather permitting. Visitors pay a fee for riding the train to the summit of Pikes Peak and must make reservations in advance. Depending on the season, the Pikes Peak Cog Railway typically provides between two and eight daily trips to the summit. The trains used on the railway can accommodate between 78 and 214 passengers per trip. The railway is operated by the Manitou & Pikes Peak Railway Co (Manitou & Pikes Peak Railway Co. 2010).

Previously, the Rampart Range Shooting Range provided a popular, though unsupervised target shooting area within the Catamount Project Area. The USDA Forest Service has temporarily closed the shooting range in 2009 after a visitor was accidentally shot and killed at the site. Prior to its closure, the range attracted approximately 40,000 visitors annually. The USDA Forest Service will consider re-opening the range after improvements are made to the site.

Dispersed Recreation

The Pike and San Isabel National Forest, including the Catamount Project Area, is generally open to dispersed recreational uses, both motorized and non-motorized. Dispersed camping and other day uses are permitted on NFS lands within the Catamount Project Area. The USDA Forest Service encourages dispersed users to practice Leave No Trace outdoor skills and ethics. Many of the known dispersed camping locations in the Catamount Project Area are along forest roads and both system and non-system trails. Dispersed users have also created many miles of non-system trails in the Catamount Project Area. The USDA Forest Service estimates that there are likely over 1,500 miles of non-system trails in the Catamount Project Area that are used by hikers, mountain bikes, and OHV users.

Dispersed uses are generally prohibited on CSU lands in the Catamount Project Area since the primary function of these lands is watershed protection. In the North Slope Recreation Area/Watershed, use is generally confined to developed recreation sites and facilities at Crystal, and North and South Catamount reservoirs. In the South Slope Watershed, CSU has prohibited public access and any type of recreational use around seven of its reservoirs in this area, though public fishing access is provided at Rosemont Reservoir. CSU has recently decided to open the South Slope Watershed to public and recreation use (CSU 2010). While changes in access/recreation policies will not include dispersed uses in the South Slope Watershed, it would open the area to a diversity of non-motorized uses (e.g., hiking, sightseeing, picnicking, fishing, etc.) that are generally consistent with CSU's public use and recreation regulations.

3.6.2 Recreation Environmental Consequences

Analysis of potential impacts to recreation resources focus on whether a proposed treatment would prevent access to or create safety hazards in popular recreation areas. Popular recreation areas include trails, day use areas, and camping areas.

Effects Common to All Alternatives

Some level of disturbance to recreation resources would occur under both alternatives. Under Alternative A (No Action), wildfires would continue and would result in views of smoke and of areas with disturbed soil and cut trees that would occur as part of fire suppression efforts. Areas subjected to wildfire would be closed to public access during suppression efforts. Therefore, both alternatives would produce impacts to recreation resources in terms of potential safety hazards and restricted public access during times of wildfires under Alternative A (No Action) or during project implementation under Alternative B (Proposed Action).

Alternative A (No Action) - Direct and Indirect Effects

Under Alternative A (No Action) the continued occurrence of wildfires would affect recreation resources. Direct effects would include visitors being restricted from using certain recreation areas during wildfire suppression. Fire history information from the Catamount Landscape Assessment indicate 80 percent of wildfires are 0.25 acres or less. These frequent, small fires would not result in permanent loss of public access to certain areas or create safety hazards. Indirect effects would include long-term effects that wildfire may have; certain areas that burn may be closed due to the need for watershed rehabilitation or due to continuing safety hazards after suppression activities have been completed. However, these closures would only occur infrequently across the Catamount Project Area. Both direct and indirect effects would result in less than significant impacts to recreation resources.

Alternative A (No Action) - Cumulative Effects

Two projects are proposed on Colorado Springs Utility (CSU) lands on the south slope of Pikes Peak. The first project, SS-09-01, is a 200 acre parcel of land on the eastern side of the South Slope unit adjacent to the 276 acres of forest management completed in 2007. This stand consists primarily of Engelmann spruce with some Limber pine, Ponderosa pine, Douglas-fir, and Aspen. Crown closure is high, in the 55 to 100 percent class and diameters averaging above 9 inches. Inventory indicates heavy tree loading with 183 to 273 trees per acre and a high basal area greater than 127. The second project, SS-09-02, is an additional 200 acres immediately adjacent to SS-09-01. Conditions and treatment prescription are essentially the same as those found on SS-09-01.

These foreseeable projects, when considered with the continued occurrences of frequent, small wildfires, would not result in cumulative effects to recreation resources. Effects would not be cumulative because of the temporary nature of area closures, and because multiple recreation areas and trails are not likely to be affected by wildfire during a particular incident.

Alternative B (Proposed Action) - Direct and Indirect Effects

Alternative B (Proposed Action) has the potential to affect views of visual resources from popular recreation areas and major travelways. Figure 5 shows priority treatment areas overlaid with major travel routes and popular recreation resources. Alternative B (Proposed Action) consists of vegetation treatments including thinning, creating openings, prescribed burning, and removing trees on up to 21,100 acres within the Catamount Project Area. It is expected that the proposed treatments would take five to ten years to complete to accomplish the initial project objectives.

Given the location of priority treatment areas relative to Colorado Springs and the high number (estimated at 1,500 miles) of non-system trails, the possibility of temporarily losing access to a particular trail or trails would be considered high. This effect would be most noticeable on NFS lands closest to Colorado Springs, along Forest Roads 368 and 370. Indirect effects would occur if recreational trail or area remains closed beyond the treatment period. However, with implementation of the design features (*2.3.6 Recreation Management*), impacts to recreation resources would be less than significant.

Alternative B (Proposed Action) - Cumulative Effects

Two projects are proposed on Colorado Springs Utility (CSU) lands on the south slope of Pikes Peak. The first project, SS-09-01, is a 200 acre parcel of land on the eastern side of the South Slope unit adjacent to the 276 acres of forest management completed in 2007. This stand consists primarily of Engelmann spruce with some Limber pine, Ponderosa pine, Douglas-fir, and Aspen. Crown closure is high, in the 55 to 100 percent class and diameters averaging above 9 inches. Inventory indicates heavy tree loading with 183 to 273 trees per acre and a high basal area greater than 127. The second project, SS-09-02, is an additional 200 acres immediately adjacent to SS-09-01. Conditions and treatment prescription are essentially the same as those found on SS-09-01.

These foreseeable projects, when considered with the treatments associated with Alternative B (Proposed Action) would not result in cumulative effects to recreation resources. Effects would not be cumulative because of the temporary nature of area closures, and because multiple recreation areas and trails are not likely to be affected by treatment activities in a particular area.

3.6.3 Visuals Affected Environment

Major Travel Routes

The LRMP lists major travel routes as having the most visual sensitivity. The most prominent feature in the Catamount Project Area is Pikes Peak which is in the central portion. The Catamount Project Area includes the north and south slope of Pikes Peak and is bounded on the northeast by Rampart Range, on the east by the City of Colorado Springs, on the south by Gold Camp Road on the west by State Highway 67 and Mueller State Park and on the northwest by Catamount Reservoir. Public access on the Pikes Peak Highway is jointly controlled between the USDA Forest Service and the City of Colorado Springs. Over 500,000 visitors per year travel to the summit of Pikes Peak. Highway 24 is a major travel thoroughfare. On the section that serves as the northeastern boundary of the Catamount Project Area, average daily traffic is approximately 30,000

vehicles (www.mesalek.com). There are several roads within the Catamount Project Area, the Pikes Peak Road (Forest Service Road 334) being the most prominent that serve as major travelways. Forest Service Roads 368 and 370 transect the southeast portion of the Catamount Project Area, which is popular for motorized recreation. High Drive enters the Jones Park and Bear Creek Trail systems from Manitou Springs. On the west side of the Catamount Project Area, Highway 67 accesses dispersed and developed recreation sites in the Crags Area (Figure 4). These roads facilitate easy access from Colorado Springs (Figure 2).

Another major travelway is the Cog Railroad, which passes from Manitou Springs to the summit of Pikes Peak. The track of the Pikes Peak Cog Railway is 8.9 miles long. The first third of the trip follows a cascading stream through dense stands of Engelmann spruce, Colorado blue spruce as well as Ponderosa pine trees. The track is built next to the stream and there are boulder fields on both sides of the train. The middle third of the trip is on a gentler grade. Right below the old settlement of Ruxton Park, the train passes through what is known as "Hell Gate", a natural gateway in the mountains. After a few more minutes, the train passes through Deer Park. At about the 5 mile point, the grade steepens again. Lake Moraine and Mount Almagre dominate the views here, and many of the trees in this area are bristlecone pine. Once the train climbs above timberline, the views become more expansive. The last 3 miles are all above timberline. To the east are views of the Great Plains out beyond the border of Colorado and Kansas. To the south, there are views of the Sangre de Cristo Range south to New Mexico. On the western horizon, just slightly to the southwest, lies the Collegiate Range. The total trip length is about 3 hours, and visitors are permitted to spend about 30 minutes on Pikes Peak before descending.

Vegetation Conditions

Vegetation conditions look different across the Catamount Project Area than they did approximately 100 years ago. Historically, the landscape appearance was altered by wildfire. As indicated in the landscape assessment, logging in the late 19th and early 20th centuries removed much of the mature forest overstory. Fire suppression has resulted in the survival and growth of virtually all conifer regeneration, and the persistent openings have regenerated and few if any new ones have been created. At higher elevations, aspen would have dominated these openings, but fire suppression has allowed conifers to overtop and shade out the aspen.

As a result of these past events the forest today has less structural diversity. Douglas-fir has encroached on non-northerly aspects, and openings have filled in with trees. Aspen and shrubs have been largely replaced by Douglas-fir and ponderosa pine. Decline in seral aspen stands has occurred where conifers encroach. Aspen stands are currently old and mostly deteriorated or regeneration is over browsed by wildlife.

The Catamount Project Area currently contains a mix of vegetation types that contribute to the landscape's visual character (Figure 4). At lower elevations vegetation is mostly Ponderosa pine and shrub, as well as Ponderosa pine mixed with Douglas-fir. Higher elevations are characterized by subalpine fir, Engelmann spruce, and aspen.

Limber pine is the largest vegetation type. It occurs at higher elevations and is interspersed with aspen. The ponderosa pine and Douglas-fir cover type dominates the lower elevations in the Catamount Project Area. These forest types correspond to the urban interface areas where the majority of the population is concentrated. Vegetation along Highway 24 is a mix of Ponderosa pine, Gambel Oak, and shrubs. Forest

stands throughout the Catamount Project Area are generally in later structural stages (e.g., more mature trees) and tend be densely stocked. This results in a closed appearance with few openings and low visual variety, as compared to historic conditions.

Gold Camp Road

The entire 36.5 miles of Gold Camp Road has a long history of use in the area. In 1901, this travelway was a railroad from Colorado Springs to Cripple Creek, Colorado. In 1922, the railway was sold and the route was converted to a vehicular road when auto tourism in the Pikes Peak region was just beginning. From 1924 to the 1930s, the road was a private toll road operated by W.D. Corley. In 1939, it became a free highway, and was known as the Gold Camp Road. In the mid-1940s, ownership of more than 25 miles of the road was deeded to the USDA Forest Service. The portion deeded to the USDA Forest Service includes segments of the road that are located on National Forest as well as some that are not. The road was open to the public until 1988 when a partial collapse of Tunnel #3 forced closure of the 8.5 mile section of the road that is the subject of this analysis. An Environmental Impact Statement (EIS) was completed in 2005 that resulted in selection of a preferred alternative to restore and reopen the collapsed railroad tunnel and reopen the closed section of Gold Camp Road to one-way traffic (Alternative E). The Road is on the National Register of Historic Places (Landis, personal communication, 2010), and as such is protected by the National Historic Preservation Act (NHPA), which requires that the historic character of the road be maintained.

Other Sensitive Scenic Resources

Other sensitive scenic resources include the viewsheds for Crystal, South Catamount, and North Catamount Reservoirs. Also sensitive are viewsheds that provide views of Pikes Peak or the Rampart Range. These features are prominent from the eastern portion of the Catamount Project Area, at the Shooting Range (accessible via Black Canyon Road) and from views along Forest Road 300, which bisects a small portion of the Catamount Project Area. There are no national landmarks visible from the Catamount Project Area, or views into the Lost Creek wilderness area.

3.6.4 Visuals Environmental Consequences

Analysis of visual resources involved examining the effects of treatment activities when viewed from foreground, middleground, and background distances from visually sensitive areas. For this project, major travel routes and popular recreation areas were considered to be visually sensitive areas. Landscape visibility (Sensitivity) is defined as a measure of an area's potential sensitivity to visual change (USDA Forest Service 1996). Visual sensitivity considers viewer volumes.the purpose of their trip, and how long they visit an area. Areas and associated viewer types considered to be potentially sensitive to visual changes include: designated park and recreation areas, major travel routes, and residential areas. Landscape visibility is important for its scenic quality, aesthetic values, and landscape merits. Sensitive travelways attract a higher percentage of users having high concern for scenic quality, thus increasing the importance of those travelways. This portion of the Pike San Isabel National Forest receives high levels of visitor use, as evidenced by vehicular traffic counts on Highway 24 (approximately 30,000 vehicles per day), visitation to Pikes Peak via the Cog Railway (50,000 visitors per year) and the forest-wide visitor use figure from the most recent NVUM survey, estimated at5.8

million visits per year. Moreover, NVUM visitor surveys conducted across many national forests show sightseeing for pleasure to consistently be one of the most frequently mentioned activities in which visitors to national forests participate.

The analysis is intended to analyze potential visual impacts at a landscape level, rather than in a particular location or locations. The exact locations of the treatments has not been determined at this time, so analysis focuses on potential impacts to visual resources at the landscape level from foreground (0 to 0.5 miles), middleground (0.5 to 4 miles), and background (greater than 4 miles) distances.

Effects Common to All Alternatives

Some level of disturbance to visual resources would occur under both alternatives. Under Alternative A (No Action), wildfires would continue and result in views of smoke and of areas with disturbed soil and cut trees that would occur as part of fire suppression efforts. Alternatives A and B would both produce impacts to scenic resources.

Alternative A (No Action) - Direct and Indirect Effects

Under Alternative A (No Action) the occurrence of wildfires would affect visual resources. Direct effects would include forest visitors viewing smoke from wildfires. They would also see management actions taken to suppress fires such as cutting of some trees and disturbing soil to create fuel breaks. However, these effects would be short-term and as a result would be less than significant. Indirect effects would occur because some wildfires would alter the landscape by blackening the soil, burning understory vegetation, and scorching or completely burning trees. These types of effects could be visible for two to five years.

Alternative A (No Action) - Cumulative Effects

Two projects are proposed on Colorado Springs Utility (CSU) lands on the south slope of Pikes Peak. The first project, SS-09-01, is a 200 acre parcel of land on the eastern side of the South Slope unit adjacent to the 276 acres of forest management completed in 2007. This stand consists primarily of Engelmann spruce with some Limber pine, Ponderosa pine, Douglas-fir, and Aspen. Crown closure is high, in the 55 to 100 percent class and diameters averaging above 9 inches. Inventory indicates heavy tree loading with 183 to 273 trees per acre and a high basal area greater than 127. The second project, SS-09-02, is an additional 200 acres immediately adjacent to SS-09-01. Conditions and treatment prescription are essentially the same as those found on SS-09-01.

Under Alternative A (No Action) when wildfires are considered with other past, present, and reasonably foreseeable action, no significant impacts would occur to scenic resources. In addition to the reasonably foreseeable projects referenced above, there would be continued wildfires throughout the Catamount Project Area. It is assumed that the reasonably foreseeable pattern of wildfires would generally be the same as previous, non-catastrophic wildfires. Wildfires would occur across the landscape, burning relatively small acreages. Fire history data from the Catamount Landscape Assessment indicate that 80 percent of historic fires burned 0.25 acres or less.

Alternative B (Proposed Action) - Direct and Indirect Effects

Alternative B (Proposed Action) has the potential to affect views of visual resources from popular recreation areas and major travelways. Alternative B (Proposed Action) would involve thinning, piling and burning, and broadcast burning. The Proposed Action consists of vegetation treatments including thinning, creating openings, prescribed burning, and removing trees on up to 21,100 acres within the Catamount Project Area. It is expected that the proposed treatments would take five to ten years to complete to accomplish the initial project objectives. The direct visual effects would include the presence of heavy equipment on sites to be treated, presence of slash, soil disturbance, fugitive dust, and for burning related activities, the presence of smoke. Effects such as fugitive dust and soil disturbance would only be visible within foreground distances. However, effects of thinning, piling and burning, and broadcast burning would be visible from middleground and background distances. Most of these effects would be short-term (i.e. the duration of time required to complete a particular treatment in a particular location). These effects would be less than significant with implementation of visuals design features (*2.3.7 Visual Quality Management*).

Indirect visual effects would include changes in views of forested landscapes that would be affected over the long-term. Figure 17 depicts two areas, one with and one without treatment, from a foreground distance. The left side of the photo shows treated conditions and allow the viewer to see to the forest floor. A decreased density of trees is also apparent. In terms of changes in lines, texture, form, and color the differences between treated and non-treated areas would not be apparent to most viewers.

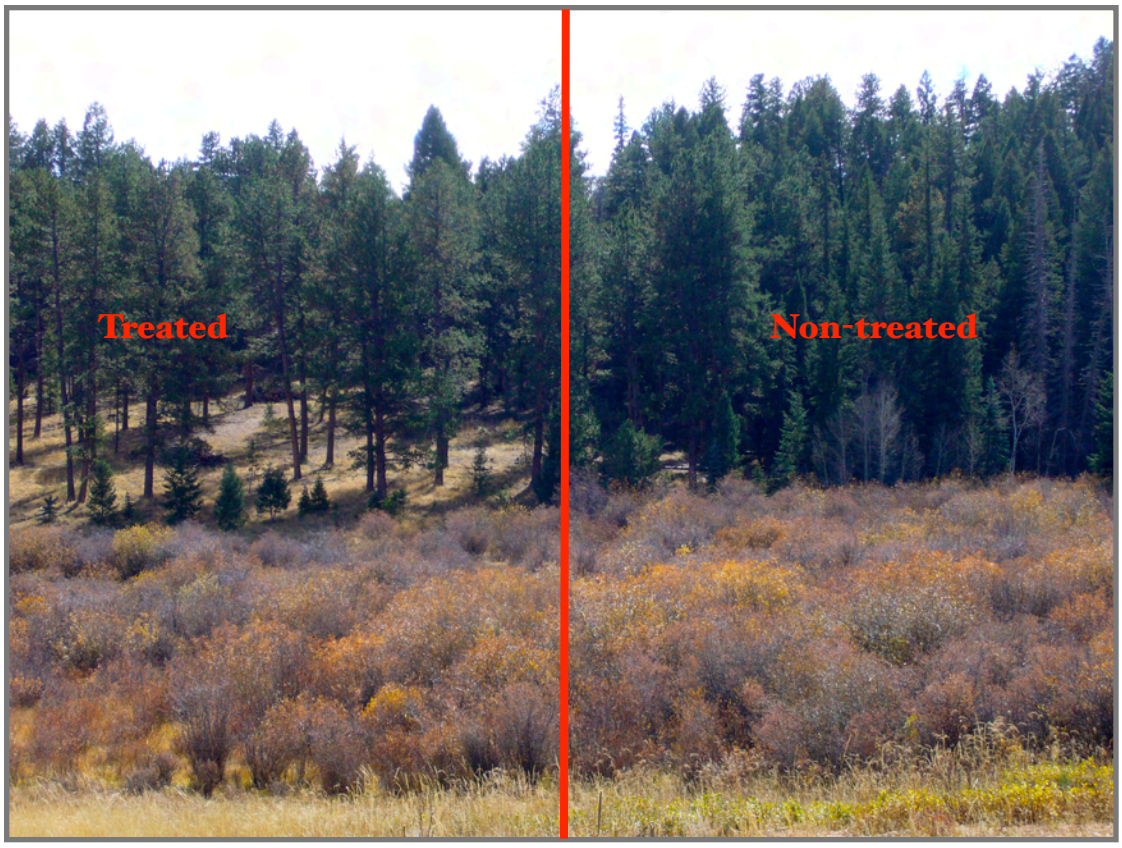

Figure 17. Comparison of Treated and Non-Treated Stands

Over the long-term as treatments are implemented across the landscape, forested landscapes would look similar to their appearance approximately 100 years ago, representing a more "characteristic" landscape. From this perspective long-term visual impacts could be considered beneficial. Alternative B (Proposed Action) would have no significant adverse impacts on visuals, but could have beneficial impacts in some circumstances by increasing age class diversity, which is a factor in determining variety class (A, B, or C).

Alternative B (Proposed Action) - Cumulative Effects

Two projects are proposed on Colorado Springs Utility (CSU) lands on the south slope of Pikes Peak. The first project, SS-09-01, is a 200 acre parcel of land on the eastern side of the South Slope unit adjacent to the 276 acres of forest management completed in 2007. This stand consists primarily of Engelmann spruce with some Limber pine, Ponderosa pine, Douglas-fir, and Aspen. Crown closure is high, in the 55 to 100 percent class and diameters averaging above 9 inches. Inventory indicates heavy tree loading with 183 to 273 trees per acre and a high basal area greater than 127. The second project, SS-09-02, is an additional 200 acres immediately adjacent to SS-09-01. Conditions and treatment prescription are essentially the same as those found on SS-09-01.

Under Alternative B (Proposed Action), the proposed management actions when considered with other past, present, and reasonably foreseeable actions, would result in no significant impacts to scenic resources because treatments are on a relatively small scale (400 acres), and would occur on lands with limited or no public access.

3.7 Socio-Economics

The socio-economics discussion is summarized from the Catamount Forest Health & Hazardous Fuels Reduction Project Socio-Economics Specialist Report (JW Associates 2010i).

3.7.1 Socio-Economics Affected Environment

Communities in the Project Vicinity

The Catamount Project Area straddles El Paso and Teller counties within the Pike and San Isabel National Forest (Figure 1). Most of the residents of El Paso County live in the Colorado Springs area, which borders the Catamount Project Area. Colorado Springs is the largest municipality in El Paso County with an estimated population of about 400,000 residents. The city accounts for nearly two-thirds of the county's population of approximately 600,000.

Colorado Springs was founded in 1871, as a resort destination, and has evolved into a world-class international community with breathtaking scenery, outstanding accommodations, a variety of exciting attractions, diverse selection of restaurants and cuisine, shopping centers, and eclectic local businesses. Gold was discovered in nearby Cripple Creek in 1891, and Colorado Springs found itself a thriving financial center. The golden years lasted until 1917, when the United States moved to silver for its coinage and the local economy once again emphasized tourism. Looking to expand its economic base, the city offered land to the military in 1942. With

the start of World War II, Fort Carson was established on 137,000 acres to the south of Colorado Springs. The military's presence grew in the 1950s with the opening of the U.S. Air Force Academy. Over the next 30 years, Peterson Air Force Base, Cheyenne Mountain Air Force Base and Schriever Air Force Base helped create Colorado Springs' reputation as the nation's military space capital, housing the North American Aerospace Defense Command (NORAD), and other Space Command centers. Manufacturing expanded tremendously when the area's quality of life and cost advantages were recognized in the 1960s and 1970s. Today, computers, electronic equipment, semiconductors, precision parts, plastics, heavy equipment and countless other high-quality products are manufactured in the Pikes Peak region and shipped to national and international markets. With its management and professional industry mix, Colorado Springs has the second highest household income of all communities within or adjacent to the Catamount Project Area (Table 20).

Table 20. Population and Income Communities[16]

Communities within Catamount Project Area boundary	Population	Household Income
Crystola	Not available	Not available
Green Mountain Falls	773	$43,816
Chipita Park and Cascade	1,709	$48,719
Woodland Park	6,515	$52,279
Communities adjacent to Catamount Project Area	**Population**	**Household Income**
Manitou Springs	4,980	$40,514
Colorado Springs	399,453	$50,892

Often ranked as the "most fit" city in the United States, Colorado Springs residents and visitors have virtually unlimited options when it comes to participating in recreational and sporting activities. Hiking, mountain biking, running, rafting, boating, rock climbing, horseback riding, fishing, golfing and ballooning are some of the most popular activities that are enjoyed year-round in the favorable, mild climate. Some of these activities occur on national forest lands within the Catamount Project Area.

Several communities lie within the Catamount Project Area; Crystola, Green Mountain Falls, Chipita Park, Cascade, and Woodland Park (Figure 2). These smaller communities rely more heavily upon forest use, lifestyles and opportunities offered in "rural" settings to maintain their livelihoods. For example, the City of Woodland Park with a population of about 7,600 residents supports tourism with many of its hotels, motels, restaurants, and other supporting businesses (source: http://www.city-woodlandpark.org/about.php). The community of Manitou Springs is the location of the Cog Railway, a major tourist attraction that draws 50,000 visitors per year.

Residents of Colorado Springs and the smaller bedroom communities realize many benefits from having forested lands within such close proximity, for many, the travel time for that outdoor "get away" is less than a

[16] Source: U.S. Census Bureau (2000)

half hour. The National Forest plays a vital role in the economic health and personal enjoyment of the residents in the vicinity of the Catamount Project Area. These benefits include:

- Recreation is an important industry, which generates a major portion of the economic base through tourism. There is an accelerating trend in outdoor recreation occurring on forest lands.
- The use of fuel wood by many households as a primary or supplementary source of heat energy has resulted in intensive collection of both dead and green wood from Forest land.
- Forage for livestock grazing is the principal resource use of grasslands.
- Wildlife within the Catamount Project Area contributes significant monetary, recreation, and aesthetic values to the area.
- The visual and environmental qualities of the forest are of significant importance to local communities because of their value in attracting tourists.
- Residents have benefited from past and present employment opportunities that have been generated directly and indirectly through mining, timber production, livestock grazing, recreational activities, tourism, and other resource related activities.

These important values are at risk of partial or complete loss due to the high wildfire hazard in portions of the Catamount Project Area.

Socio-economic Assessment and Wildfire Risk

As part of the Catamount Landscape Assessment, a socio-economic assessment was conducted, for which various stakeholders were interviewed, based on their interest and use of the Catamount Project Area. Targeted interviewees included representatives from residents and landowners, local governments, grazing permittees, recreational users, and local businesses with a vested interest in the management of the Catamount Landscape Analysis Area. Business owners and employees that were interviewed depend on this area for a variety of activities including: hiking, fishing, camping, photography, OHV, horseback riding and mountain biking. From the interviews, four general themes emerged:

1. Forest Health/Fuels
2. Trails and Uses
3. Development and Growth
4. Local Uses

The forest health/fuels issue is the most relevant to the Proposed Action and is summarized below. The current condition of the forest was addressed by the majority of those interviewed. The majority of interview participants understood that there is a need for fuels management to reduce the risk of wildfire. Various types of fuels treatments were discussed in the interview process (prescribed burning, wildland fire use, and mechanical treatment). The preferred forest health and fuels management treatment was mechanical treatments versus prescribed burning. Some participants were not opposed to any type of fuel treatment recognizing that each treatment would be effective as long as it was managed appropriately. Some interview participants did not want any part of prescribed burning due to fear that the fire would escape. The Hayman Fire was mentioned many times during this discussion.

The interview participants stressed a well-managed treatment was needed and a treatment that was not well-managed could result in unwanted outcomes, including erosion and degrading the scenic qualities of the area.

The most prominent commonalities that emerged from the socio-economic assessment were:

- There is a forest health problem that is contributing to the fire hazard to the communities and watersheds
- If done properly forest management actions are acceptable and will lessen if not alleviate the risk
- Fear that officials cannot control a prescribed fire lead to the mechanical treatment as the preferred treatment
- The Hayman Fire has had a profound effect on the communities and has shaped the way the local people feel about fuel treatments
- Clearcutting is not acceptable

The social assessment demonstrated that forest health and fuels are a widespread concern, and that there is support to conduct various forest management activities to reduce wildfire risk.

Additional documentation demonstrating further support for forest health and fuels management activities is found in a study conducted by Clement et al. (2010). As part of the Woodland Park Healthy Forest Initiative (WPHI), researchers at Colorado State University conducted a survey of Woodland Park residents regarding their opinions on forest management activities and the values they associate with forests. Forty percent of the survey respondents had heard of the WPHI, through a variety of media, with newspaper or newsletter being the most prominent. About two-thirds (68 percent) of the respondents lived in the Woodland Park area during the Hayman Fire, and among this group, about one-third (31 percent) indicated they were directly impacted by this wildfire. When asked about reasons for conducting various forms of vegetation management, strongest support (91 percent of respondents) was for "fire prevention to protect life and property." "To create or improve wildlife habitat" and "to salvage dead or dying trees" also received high levels of support from 91 and 85 percent of survey respondents, respectively. In terms of the types of vegetation management supported by respondents, highest support was for "forest thinning" (91 percent), followed by "prescribed fire" at 65 percent. In contrast, support for clear-cutting patches that are more than five acres was low, with only 14 percent of survey respondents favoring or strongly favoring this form of vegetation management. In terms of the types of values associated with forests, the highest levels (greater than 90 percent) of support were demonstrated for forests' aesthetic, biological diversity, life sustaining, and future values. In summary, survey results show a modest level of awareness about the WPHI, and high levels of support for forest thinning and prescribed burning activities. Survey results also show that respondents hold multiple values for forests in and around Woodland Park.

Wildland Urban Interface Lands

The Wildland-Urban Interface (WUI) can be described as the area where manmade structures or improvements (primarily homes and businesses) occur within or near areas of natural terrain and vegetation, and wildland fire potential exists (Figure 2). During the past few decades, population in the WUI has increased. Within the Catamount Project Area, approximately 54 percent (56,700 acres) of the area is within 1 mile of at least 1 inventoried structure. Of that, approximately 66 percent (37,100 acres) are National Forest System lands. The areas where structures (mostly residential) are most dense occur in three areas: along

Highway 24, from Cascade to Woodland Park; in the Manitou Springs area north of the highway in the Black Canyon area; and southeast of the main town of Manitou in the Eagle Mountain area. These three areas comprise approximately 40 percent (22,700 acres) of the total 56,700 acres within one mile of inventoried structures, with only about 40 percent occurring on National Forest System land.

Municipal Watershed Reserves

A series of Congressional legislation and cooperative agreements have designated 29,473 acres as municipal watersheds for Colorado Springs, Manitou Springs and Cascade Town Company. These lands more or less coincide with the 10E management area in the 1984 Forest Plan (Forest Plan Maps 3 and 4). Within these lands there are three reservoirs owned and managed by Colorado Springs Utilities; North Catamount, South Catamount, and Crystal Creek reservoirs.

The Front Range of Colorado experienced major impacts to municipal water supplies as a result of flooding, erosion and sediment deposition after the 1996 Buffalo Creek Fire, 2000 Bobcat Fire, and 2002 Hayman and Schoonover fires. The Hayman fire burned just northwest of the Catamount Project Area. The Denver Water Department and City of Aurora will spend up to $40 million to mitigate the effects of those fires on their water supply system. The Pikes Peak Watershed Assessment (JW Associates 2009) ranked most of the watersheds in the Catamount Project Area as Category 5 (highest hazard). The Watershed/Soils Specialist Report for the Catamount Project (JW Associates 2010d) describes and analyzes the hazards posed by the current conditions of these watersheds.

Community Wildfire Protection Plan (CWPP)

The Healthy Forest Restoration Act (HFRA) of 2003 emphasizes the role of community planning and offers a variety of benefits to communities with a Community Wildfire Protection Plan (CWPP) including matching federal grants for fuel reduction projects. A CWPP requires approval by local governments, fire authorities, and the state forest management agencies in consultation with federal land management agencies.

The communities of Cascade, Chipita Park, and Green Mountain Falls worked together along with local and federal agencies to develop the Ute Pass CWPP, which lies almost entirely within the Catamount Project Area. Additionally, Woodland Park has been selected as a demonstration community by the Front Range Roundtable to improve forest health and develop local biomass opportunities. The community will receive grant funding and work with state, federal and local agencies to develop a comprehensive plan to treat acres in need of attention, to utilize harvested material and establish a local capacity for processing. Their mitigation strategy is to create fuel breaks or buffer zones in the high value, high risk areas. The forested areas surrounding Woodland Park have been identified as a unique and serious fire hazard to the residents of Teller County, and are slated for priority fuels treatment within the Teller County CWPP.

Other values at risk are described in the Catamount Forest Health & Hazardous Fuels Reduction Project Recreation Specialist Report (JW Associates 2010g) and Management Indicator Species Specialist Report (JW Associates 2010e) and Biological Assessment/Biological Evaluation (JW Associates 2010f).

3.7.2 Socio-Economics Environmental Consequences

The analysis includes quantitative and qualitative components, and is largely focused on economic analysis, rather than social analysis. Social analysis was deemphasized because previous surveys of stakeholders in and around the Project Area as well as a recent survey of Woodland Park residents both demonstrated strong support for the Proposed Action. The quantitative portion of the economic analysis was conducted by calculating net present values (NPVs) for costs associated with the Alternative A (No Action) and Alternative B (Proposed Action). Since revenues were not calculated for either alternative the basis for comparison is not NPV per se, but the net difference (or savings) in costs.

Three sets of assumptions were made in the quantitative analysis.

1. The first assumption is that applicable cost categories and unit cost values would generally be the same as those used in the economic analysis for the Upper South Platte Protection and Restoration Project (USDA Forest Service 2002b).
2. The second set of assumptions pertain to how many units for a particular resource would be affected under each alternative, such as the miles of streams restored or the number of recreation facilities replaced following a wildfire. Identification of the number of affected units was accomplished based on GIS queries of the area that would be affected by wildfire. The average number of units per acre that could be affected was calculated based on the average number of units per acre for the entire acreage of the Project Area.
3. The third set of assumptions pertain to wildfire probabilities. A calculation was made based on the changes in wildfire probability from vegetation treatments. Treated areas were given a 2 percent probability, areas surrounding the treated areas were given a 6 percent probability and untreated areas were given a 10 percent probability. The result is that the probability of a wildfire occurring in the Catamount Project Area, in any given year would be 10 percent under Alternative A (No Action), and 6.2 percent under Alternative B (Proposed Action). The probability of a fire occurring on untreated areas was based on the Mean Fire Interval (MFI) of 9.2 years (USDA Forest Service 2002b), or a mean annual probability for a given area of ten percent. The MFI is based on data obtained from Brown et al. (1999). The probability of a fire occurring in relatively open historic landscapes is much lower. It is based on an MFI 50 years (Kaufmann et al. 2001), which equates to a two percent probability for a given area in any year. Finally, the 10,000-acre fire size was based on the average size of two recent large fires (Buffalo Creek and High Meadow fires) that occurred in the project vicinity in the last decade.

Additional supporting information on unit cost information, number of units affected, and wildfire probability are presented in detail in the Catamount Forest Health & Hazardous Fuels Reduction Project Socio-Economics Specialist Report (JW Associates 2010i).

The broadly defined cost categories in the NPV analysis include:

- Fire suppression
- Resource damage (multiple categories)
- Burned area restoration
- Fuels treatment

Cost information for the above first three cost categories listed above was taken from the Upper South Platte Economic Analysis (USDA Forest Service 2002b) and the costs for lost hydropower were estimated by Colorado Springs Utilities (JW Associates 2010i). For timing of costs it was assumed that all treatments were a one time cost and completed at year zero. Wildfire suppression and ancillary costs were averaged over 15- and

30-year time periods and compared. This was done since the probability of a wildfire is expressed on an annual basis and is applied to fire suppression, fire damage, and burned area restoration costs. Since costs from the USDA Forest Service (2002) report are eight to ten years old, an inflation adjustment factor of 1.2 (Sahr 2010) was applied to costs in each category. Treatment costs were based on recent stewardship contract awards for thinning and USDA Forest Service costs for prescribed burning and were assumed to average $500 per acre.

Finally, the Catamount Project Area includes 21,100 acres that would be treated, and the analysis time period is assumed to be 30 years, because the proposed treatments are expected to be effective for this time period, or longer. The qualitative analysis focused on how well each alternative meets the objectives associated with the Proposed Action.

Effects Common to All Alternatives

Both alternatives would involve costs for fire suppression, resource damage, and burned area restoration in response to wildfires. These costs would occur for fires that would burn in any location within the 98,000-acre Catamount Project Area in any given year, over a 30-year time period.

Alternative A (No Action) - Direct and Indirect Effects

Alternative A (No Action) would have no treatment costs. Current management actions such as fire patrols, road maintenance, and wildfire suppression would continue, but efforts to treat areas to reduce wildfire hazards would not occur.

Depending on the timing of future wildfires, costs could be a combination of direct (current) and indirect (future) effects. If a wildfire would occur in 2011 the initial costs associated with fire suppression and burned area rehabilitation would be direct effects, while all other costs such as stream restoration would occur later in time and therefore would be indirect effects.

Under Alternative A (No Action), the NPV of costs would be approximately $55.2 million for a 15-year analysis period (Table 21) and approximately $85.8 million for a 30-year analysis period (Table 22). The largest proportion of these costs would be borne by private landowners, followed by CSU and then the USDA Forest Service. Incurring these costs would result in less than significant impacts.

Table 21. Cost comparison of Alternatives A and B using 15-year Period

Alternative	Alternative A	Alternative B	
Wildfire Probability	10.0%	6.2%	
Present Net Value ($1,000,000s)			**Treatment Costs**
All Partners	-$55.19	-$33.97	$10.55
Municipal	-$18.02	-$11.09	$0.00
Private	-$30.08	-$18.51	$0.00
USDA Forest Service	-$7.10	-$4.37	$10.55
Net Savings ($1,000,000s)			**Including Treatment Costs**
All Partners	-	$21.23	$10.68
Municipal	-	$6.93	$6.93
Private	-	$11.57	$11.57
USDA Forest Service	-	$2.73	-$7.82

Table 22. Cost comparison of Alternatives A and B using 30-year Period

Alternative	Alternative A	Alternative B	
Wildfire Probability	10.0%	6.2%	
Present Net Value ($1,000,000s)			**Treatment Costs**
All Partners	-$85.84	-$52.83	$10.55
Municipal	-$28.03	-$17.25	$0.00
Private	-$46.77	-$28.79	$0.00
USDA Forest Service	-$11.04	-$6.79	$10.55
Net Savings ($1,000,000s)			**Including Treatment Costs**
All Partners	-	$33.01	$22.46
Municipal	-	$10.78	$10.78
Private	-	$17.99	$17.99
USDA Forest Service	-	$4.25	-$6.03

Alternative A (No Action) - Cumulative Effects

Two projects are proposed on CSU lands on the south slope of Pikes Peak. The first project, SS-09-01, is a 200 acre parcel of land on the eastern side of the South Slope unit adjacent to 276 acres of forest management completed in 2007. This stand consists primarily of Engelmann spruce with some Limber pine, Ponderosa pine, Douglas-fir, and Aspen. Crown closure is high, in the 55 to 100 percent class and diameters averaging above 9 inches. Inventory indicates heavy tree loading with 183 to 273 trees per acre and a high basal area greater than 127. The second project, SS-09-02, is an additional 200 acres immediately adjacent to SS-09-01. Conditions and treatment prescription are essentially the same as those found on SS-09-01. These foreseeable projects, when considered with the treatments associated with Alternative A (No Action) would not result in cumulative effects to socioeconomic resources. Effects to resources with social value, specifically recreation and visual resources, have been described in other specialist reports. Effects to the NPV of costs of wildfire

suppression and related costs would not be cumulative because the above referenced projects are small relative to the Proposed Action and costs would be borne by the CSU rather than private landowners or the USDA Forest Service.

Alternative B (Proposed Action) - Direct and Indirect Effects

Costs of fuel treatments would all be direct effects since they would be incurred as part of project implementation. As stated above wildfire suppression, resource damage, and burned area restoration costs could be either direct or indirect costs.

The NPV of all costs would be approximately $34.0 million under a 15-year period (Table 21) and $52.8 million under a 30-year period (Table 22). As with Alternative A, the majority of costs would be borne by private landowners. However, under this Alternative the investment of $10.55 million in fuel treatments by the USDA Forest Service would result in a reduction of private property loss of approximately $18 million dollars over a 30-year time period, and the net savings to all parties would be about $22.5 million (Table 22). The reason for these savings is due to a 30 percent reduction in the risk of wildfire (from 10 to 6.2 percent), and would result in beneficial impacts.

These cost savings are based on reduced to damages to various resources and public infrastructure depicted in the 13 cost categories referenced above. Table 23 provides a qualitative summary of the benefits of implementing the Proposed Action relative to meeting the project objectives. Additional detail on the resource related benefits for these objectives may be found in the appropriate specialist reports.

Table 23. Effects of Alternatives on Meeting Project Objectives

Project Objectives	Alternative A (No Action)	Alternative B (Proposed Action)
To reduce the risk that a wildfire would negatively affect the municipal watershed reserves for the cities of Colorado Springs, Green Mountain Falls, Cascade, Chipita Park and Manitou Springs.	Wildfire risk is 10%	Wildfire risk reduced to 6.4%
To reduce fuels and associated risk of extreme fire behavior in the Wildland Urban Interface.	Fuel loadings remain the same or increase	Fuel loadings of downed and dead material are substantially reduced
To improve forest health, vigor, and resistance to fire, insects and disease.	Forest health conditions or deteriorate over time	Forest health conditions improve with better growth rates, and more heterogeneous stands
To reduce the risk of severe flooding and sedimentation for the protection of public safety, water system infrastructure, and other natural and developed resources.	Sediment loading increases, damage would occur to private residences, public recreation resources, miles of stream habitat and forested habitat	Sediment loading is substantially reduced, damage to private residences, public recreation resources, miles of stream habitat and forested habitat is also substantially reduced

Alternative B (Proposed Action) - Cumulative Effects

Two projects are proposed on CSU lands on the south slope of Pikes Peak. The first project, SS-09-01, is a 200 acre parcel of land on the eastern side of the South Slope unit adjacent to the 276 acres of forest management completed in 2007. This stand consists primarily of Engelmann spruce with some Limber pine, Ponderosa pine, Douglas-fir, and Aspen. Crown closure is high, in the 55 to 100 percent class and diameters averaging above 9 inches. Inventory indicates heavy tree loading with 183 to 273 trees per acre and a high basal area greater than 127. The second project, SS-09-02, is an additional 200 acres immediately adjacent to SS-09-01. Conditions and treatment prescription are essentially the same as those found on SS-09-01. These foreseeable projects, when considered with the treatments associated with Alternative B (Proposed Action) would not result in cumulative effects to socioeconomic resources. Effects to resources with social value, specifically recreation and visual resources, have been described in other specialist reports. Effects to the NPV of costs of implementing the Proposed Action would not be cumulative because the above referenced projects are small relative to the Proposed Action and costs would be borne by the CSU rather than private landowners or the USDA Forest Service.

3.8 Cultural/Heritage Resources

3.8.1 Cultural/Heritage Resources Affected Environment

The Catamount Project Area can be divided into two geographic regions: South Rampart Range and Pikes Peak. There are four vegetation zones: Ponderosa pine forest, lodgepole pine forest, Engelmann spruce forest, and alpine/tundra. The proposed project activities would take place in the forested zones.

The area was used by prehistoric people for habitation, resource procurement / processing, and transportation corridors. The historic uses include; homesteading, lumbering, ranching, mining, settlement, transportation, communication, recreation, and tourism. Heritage resource investigations have been conducted within the Catamount Project Area with both historic and prehistoric sites being identified and recorded. Of these previously recorded sites there some listed, some listed as a National Monument, and some sites recommended eligible for listing to the National Register of Historic Places (NRHP).

Prior to implementation, background research will be conducted to identify previously conducted heritage resource investigations, previously identified / recorded prehistoric / historic phenomena, and identify cultural phenomena recommended eligible for or listed on the National Register of Historic Places (NRHP). Areas with adequate Cultural Resource investigations would not need additional inventory and sites eligible for nomination / listing to the NRHP would be protected / mitigated from proposed project activities. In addition, background research would assist with developing heritage resource inventory strategy and predict site density.

Numerous comprehensive efforts to identify and evaluate cultural sites have been conducted within the Catamount Project Area. This prior work includes a number of Cultural Resource Reports (CRR) completed in the period between 1984 to 2010; these previous investigations were done primarily to satisfy the requirements of Section 106 of the National Historic Preservation Act (NHPA).

These cultural resource surveys were for wildfire salvage/rehabilitation, timber sales, wildlife, prescribed burns, grazing allotments permit re-issuance, watershed improvements, recreation, mineral permits and other projects proposed by the USDA Forest Service and private venture. A few of these prior investigations were done to further the knowledge of known or suspected cultural properties.

It should be noted that surveys conducted before 1985, when field methods could be described as "reconnaissance" by one or two individuals, are not considered as adequate cultural resource survey. Standards for survey coverage was upgraded according to new Colorado State Office of Archaeology and Historic Preservation (OAHP) in that year, and since 1985 all field surveys employ systematic and thorough pedestrian inspection of most if not all of individual project areas.

Through these prior investigations, cultural properties were identified, recorded and evaluated. The records for these previously known properties were reviewed during the current analytical process in terms of site significance, meeting criteria for entry into the National Register of Historic Places (NRHP), location and for potential impacts.

If a site(s) are located / recorded and determined / recommended eligible for listing or nomination to the NRHP the proposed fuels treatment impacts to the site(s) would be mitigated through avoidance or Memorandum Of Agreement (MOA) with the State Office of Archaeology and Historic Preservation (OAHP/ SHPO) prior to any affects taking place to the site.

"Historic" properties refers to site(s) with materials and items common to European immigrant cultures of the Western Frontier and the use of such properties date after AD 1860 in the Pike and San Isabel National Forest. "Prehistoric" properties refers to sites with materials and items common to American Indian cultures of Colorado, and the use of these sites usually date before AD 1860 and may be much earlier (even several thousand years). A site's eligibility status is based on content in terms of documented archeological deposits and the potentially valuable information they contain, historic engineering attributes, and / or association with important historic events or persons.

"Prehistoric" properties (sites) are characterized generally as surface areas of stone tools, stone tool manufacturing debris, and in some cases, fire-cracked rock and ground stone for processing plant material. Prehistoric sites may include concentrations of finished tools and manufacturing debris; such concentrations may represent the remnants of temporary dwellings or outdoor activity areas. Total quantities of material items on surface properties range from less than ten to approximately seventy-five. Prehistoric sites with these manifestations are usually interpreted as camps, or as resource collecting and processing areas. Thus, most of the known and recorded prehistoric properties recorded during previous investigations represent locations where small prehistoric social groups resided for a short period while harvesting local resources, or some of the smaller sites may be areas where collected resources were processed or consumed. Processing sites either consist of formal shaped stone tools for processing meat or vegetable resources or ground stone for processing vegetable resources. The prehistoric sites thought to be seasonal campsites have comparatively few total amounts of surface items. Prehistoric sites in the general area have more than seventy-five (75) total surfaces items. It is not uncommon in other parts of the Pike and San Isabel National Forest for sites to have fifty (50) to one hundred (100) or even more than one hundred (100) surface items.

American Indian groups also harvested the cambium layer of ponderosa pine (and possibly other conifers) by removing a strip of bark from these trees for use as a foodstuff, medicine and/or for ceremonial purposes. Similar trees, in other locations within the Pike and San Isabel National Forest have been recorded and the peeling scars dated. The date range for the scars falls within the decades of the early 19th century (AD 1820-1860). In addition, American Indian groups also created prayer and directional trees. These tress (conifers) would have been saplings when manipulated by bending the tree to the ground and tied into place with straps secured by stakes. The difference is that directional trees point toward a sacred mountain / landscape or places while the prayer tree may also point to one of the previously mention locations as well as cardinal direction. The prayer trees would then be adorned with offerings to invoke good tidings. Both of these types of culturally modified trees are sites in their own rite and are considered / recommended eligible for inclusion / nomination to the National Register of Historic Places and are known to be located in the vicinity of the Catamount EA.

Another prehistoric property not characterized as surface areas or peeled / sacred / medicine trees there are also rock shelters located in granite outcrops adjacent to stream courses. These overhangs are ideal campsites for mobile groups harvesting and consuming local resources during any season when the area was not rendered impassible by heavy snowfall. The depth of cultural deposits in these shelters is greater than one meter, suggesting a fairly lengthy total period of use (perhaps several thousand years). Because the total volume of deposit for each shelter is substantial, these properties have the potential to contribute important data to our knowledge of prehistoric cultures in the eastern portion of montane Colorado.

Quarries are discrete areas where local bedrock outcrops provided raw materials suitable for the manufacture of flaked stone tools (the stone raw material must be suitable for creating sharp and durable edges or points). Quarry sites containing these outcrops plus evidence of prehistoric activity such as portable and usable fragments of the quarried raw material ("cores" or "blanks") and waste material ("debitage") remaining from on-site stone tool manufacture.

In general, the prehistoric sites in the area appear to be surface in nature with shallow cultural deposit. It is thought that most of the prehistoric sites in the general area date to the late period (A.D. 1500-1870). However, several projectile points identified during previous field work date much earlier; a few, based on their morphology, may have been manufactured more than 2000 years ago. It could not be determined from the available information whether these are items salvaged from early archeological contexts and used by later groups, or whether they actually reflect early use of the general vicinity. It may be that some of the sites contain a mixture of deposits and materials representing the late period and an earlier use.

There are prehistoric properties within the Catamount Project Area that are recommended eligible for inclusion and listed on the NRHP. These properties contain preserved archeological deposits that are storehouses of archeological and cultural information. The deposits are potential sources for addressing research problems in Colorado Mountain archaeology; for example, calculating the time span of prehistoric occupation in the southern Rocky Mountains, or reconstructing the subsistence patterns and other lifeways of indigenous social groups. Sites may be important as traditional cultural areas to the modern descendants of the American Indian peoples who previously inhabited the eastern part of the Colorado mountains area. Some tribes have indicated in previous consultations that peeled or scarred trees, medicine / directional trees, and

overhangs / crevices and rock shelters were used by historic Indian tribes are important cultural resources; they are regarded as such by the USDA Forest Service and are protected.

Tribal governments and other officials of tribes, and cultural representatives with possible traditional ties to the area, or those tribes that have previously indicated interests, were contacted regarding the Catamount EA. No tribal groups have responded to these contacts at this time.

There are historic site(s) that were identified through survey or background research within the Catamount EA. Historic sites in the general area reflect a variety of activities and uses of National Forest system lands. Common historic themes in the content and context within the EA proposal area are homesteading, ranching, logging, mining, transportation, communication and recreation / tourism. There are known historic sites recommended eligible / listed on National Register of Historic Places.

3.8.2 Cultural/Heritage Resources Environmental Consequences

Alternative A (No Action) - Direct and Indirect Effects

Only existing and planned activities, previously approved under other NEPA documents, would occur as a result of this alternative. These existing and planned activities would comply with federal law(s) and acts as applicable as well as follow the Forest Plan as they apply to Heritage Resources.

Indirect effects would include potential destruction or damage of archaeological sites and historically significant buildings and structures within the Catamount Project Area and surrounding areas. Such a fire could damage or destroy combustible materials found in historic-era archaeological sites and historic buildings. Other effects of such a fire could include erosion of archaeological deposits on slopes destabilized by the loss of vegetation.

Alternative A (No Action) - Cumulative Effects

The implementation of Alternative A should result in only negligible loss of archeological soils and the artifacts contained therein. As long as cultural resource surveys have taken place and OAHP/SHPO has been allowed to comment any related or future resources management projects in the area. There would be minimal effect to unknown heritage resources and no effect to known heritage resources.

Alternative B (Proposed Action) - Direct and Indirect Effects

Implementation of Alternative B (Proposed Action) has the potential to directly affect cultural properties. To meet its responsibilities under Section 106 of the NHPA, the USDA Forest Service would complete archaeological surveys within the Catamount Project Area and would complete formal National Register eligibility evaluations for all previously recorded and newly recorded archaeological sites that could potentially be adversely affected by the proposed actions. These sites would be flagged and fenced to protect them from direct impacts. Mechanical equipment and workers would be kept out of the protected areas. Alternatively, the USDA Forest Service may chose to avoid the need for formal eligibility evaluations of all recorded sites by avoiding adverse effects to these sites. Under this option, the USDA Forest Service would delineate the

horizontal boundaries of these sites and would establish a fenced protective 100-foot buffer around the sites. These actions would prevent direct effects.

The inadvertent discovery of historic or prehistoric material is possible. If an archaeological discovery is made all work would stop within 100 feet, the Pikes Ranger District, Zone Archeologist and Forest Archeologist would be notified.

Some direct impacts to heritage resources that do not meet the National Register criteria could result from the proposed activities; however, because these sites are not significant, the impacts would be considered less than significant.

In general, indirect effects associated with the implementation of Alternative B, might eventually expand to archeological sites located outside of the proposed project boundary. Therefore a buffer of 164 feet (50m) outside of the proposed project boundary would be inventoried. It is possible that staging areas access (roads, temp roads, skid trail) and erosion (slope wash / slope destabilization) has the potential to effect historic and prehistoric properties located outside of the project area therefore staging areas and access for a proposed activity is part of the Area of Potential Effect and requires Heritage Resource inventory.

Hand Thinning

Hand thinning entails the use of chainsaw to cut tree stems at ground level. This activity has to comply with the National Historic Preservation Act (NHPA) as amended and directions in the Forest Plan. This activity may be covered for implementation based on the Fuels Treatment PA.

Prescribed Fire

Prescribed fire activities, including pre and post associated activities, have the potential to affect heritage resources (fire line – dozer/hand, fire, fire intensity, suppression / control). Heavy equipment used for the creation of fire lines, and hand constructed line has the potential to disturb cultural material by affecting the sub surface stratigraphy and removal / disturbance of surface constituents. Fire when it is introduced has the potential to affect historic and prehistoric organic surface phenomena. Subsurface disturbance by fire is based on fire intensity and duration. Fire suppression / control has the potential to effect heritage resources through water drops / hand lines / and dozer lines and or hot spot suppression. This activity has the potential to effect heritage resources through disturbance of surface and subsurface cultural material.

Prescribed burning of carries with it a small risk of escape. This risk would be minimized by strict adherence to all precautions and policies for prescribed burns, however, the risk cannot be eliminated. It is unlikely that prescribed burning would have any impact on prehistoric archaeological sites. Prehistoric sites within the Project Area have already been subjected to a cycle of numerous natural fires over the thousands of years represented by these sites.

Mechanical Fuel Treatment

Mechanical fuel treatment has the potential to affect heritage resources. Staging areas and access routes need to be included into the proposed project are Area of Potential Effect (APE) to address heritage resource concerns. The tire or track on the machine has the potential to churn and disperse surface and subsurface

cultural deposits. The thinning blades have the potential to affect above surface cultural manifestations by chopping. The removal of downed trees using conventional logging systems has the greatest potential for ground disturbance and therefore the greatest potential to impact unknown, buried archaeological deposits. Known sites would be protected as discussed above.

The long-term risk of wildfire, especially a large, intense crown fire, would be reduced by the proposed actions. Although the risk of such a fire is not eliminated, it would be lessened by the vegetation treatments and fuel breaks created by openings. It would be more likely that fires started in the Catamount Project Area would burn less intensely and be more limited in extent. There would be less likelihood that historic sites would be burned or could not be protected by fire fighting efforts. Fires that burn at a lower intensity are also less likely to create the types of erosion that could damage archaeological deposits on destabilized slopes.

Alternative B (Proposed Action) - Cumulative Effects

The implementation of Alternative B should result in only negligible loss of archeological soils and the artifacts contained therein. As long as cultural resource surveys have taken place and OAHP/SHPO has been allowed to comment any related or future resources management projects in the area. Alternative B (Proposed Action) would have minimal effect to unknown heritage resources and no effect to known heritage resources.

3.9 Consistency with the Forest Plan

The proposed actions are designed to meet all the applicable Forest Plan standards. Alternative B is consistent with the Forest Plan standards for all resources. Detailed analysis of how the actions would comply with Forest Plan standards are contained in the Specialist Reports.

3.10 Irreversible and Irretrievable Commitments of Resources

3.10.1 Forest Resources

The proposed vegetation treatments would not cause any irreversible commitments of forest resources.

3.10.2 Wildlife

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time, such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or road.

There would be no irreversible or irretrievable commitments of resources related to fish and wildlife species or their habitats under Alternative A (No Action) or Alternative B (Proposed Action). Loss of old growth could represent an irretrievable loss of habitat, although no known old growth stands would be lost.

3.10.3 Watershed and Soils

Any soil lost from the Catamount Project Area would be considered an irreversible and irretrievable commitment of the soil resource. BMPs would be used to minimize soil productivity losses from vegetation treatment activities. There would not be irretrievable loss of soil productivity, as landings and skid trails would be ripped and seeded where productivity has been reduced.

None of the proposed activities by themselves would result in irretrievable effects to water quality.

3.10.4 Visual Resources

There would be no irreversible or irretrievable commitments of visual resources. Most of the effects described previously would be short-term. The long-term effects of proposed treatments would result in changed views of forested areas, but these changes would not be irreversible or irretrievable. At some point time, absent future similar treatments, the forested landscape would eventually return to its current appearance.

3.11 Short-term Uses and Long-term Productivity

3.11.1 Forest Resources

Alternative B (Proposed Action) would show a short-term reduction in the amount of standing timber volume in the area following the proposed commercial timber harvest. The decrease in density would improve the vigor of the remaining trees making them less susceptible to wildfires and attack by insect and disease.

3.11.2 Fire and Fuels

The fuels management activities, as described under the proposed alternative, would create some short-term disturbances but in the long-term, productivity would be enhanced. The proposed treatments would change the structural stages and related crown fire hazard ratings for forested stands. Potential short-term impacts could occur through disturbance of wildlife and plant habitat, soil disturbance, and stream sedimentation, but the changes in stand composition would reduce the long-term potential for crown fire propagation. Overall, a lower crown fire hazard would result in less environmental damage to wildlife, water, range, recreation, and private lands and structures.

3.11.3 Wildlife

As provided for by the amended Forest Plan (USDA Forest Service 1984), specific standards, objectives, and guidelines would be applied during implementation of Alternative B (Proposed Action) through the use of specific design criteria (*2.3 Design Features*). Adherence to these requirements would ensure that long-term productivity of the land is not impaired by short-term uses. There would be short-term impacts to vegetation, habitat, and fish and wildlife species during vegetation treatments. However, the project goals are to increase

ecological productivity in the long-term. Monitoring conducted at the Forest level would be applied to allow for adaptive management of the resources to protect long-term productivity.

3.11.4 Watershed and Soils

The soil resource is a key ingredient for maintaining the long-term productive potential for an area. Erosion and effects that may be detrimental to the soil resource would be minimized through use of careful design and BMPs. Soil protection measures in the Forest Plan Standards and Guidelines would maintain critical soil parameters and nutrients, ensuring long-term productivity.

Short-term effects of the proposed activities could include a small change in sediment delivery. Where increased sediment delivery is predicted, it could continue for an indefinite period of time, depending on vegetative recovery and maintenance of roads. These effects are negligible and would not affect long-term productivity. Beneficial uses would not be adversely affected.

3.11.5 Visual Resources

The short-term effects of Alternatives A and B would not result in long-term effects on visual resources. The major scenic features in the Catamount Project Area (Pikes Peak, Rampart Range, Catamount, Crystal reservoirs) would not be changed by either alternative. Nor would views along major travelways or at popular recreation areas be permanently changed. Over the long-term the visual resources in the Catamount Project Area would be substantially altered.

3.12 Unavoidable Adverse Impacts

3.12.1 Fire and Fuels

Some minor, short-duration impacts are expected from conducting prescribed burning. Potential impacts would include short-term decreases in air quality due to smoke, and would be addressed during the preparation of prescribed fire burning and smoke management plans. Mitigation measures would be developed and implemented as needed.

3.12.2 Wildlife

Under Alternative B (Proposed Action), wildlife habitat for certain species would be adversely affected to varying levels. During implementation of the treatments, noise, soil compaction, fire, and vegetation removal would reduce the amount of available habitat. Likewise, there may be a direct take in some species and their nests. Over the long-term, the diversity and functionality of the habitat would increase.

3.12.3 Botany

Some potential habitat for R2 Sensitive plant species might be disturbed during vegetation treatment activities.

3.12.4 Watershed and Soils

Long-term soil productivity would not be adversely affected. However, soil erosion may contribute to a slight decrease in soil productivity. None of the proposed activities would result in an unavoidable adverse environmental effect on water quality.

3.12.5 Visual Resources

Unavoidable, adverse but short-term effects would result from the Alternative B (Proposed Action). As stated above, project treatments would result in ground disturbance that would be viewable from foreground distances, and would produce smoke viewable from middleground and background distances. Some visitors to the Catamount Project Area may not notice these changes. However, some proportion of the visiting population would notice ground disturbance and smoke and be negatively affected by it. Therefore, there would be short-term, unavoidable adverse effects to visual resources.

3.13 Other Required Disclosures

3.13.1 Wildlife

No waters would be impounded or diverted as part of the project so coordination with the US Fish and Wildlife Service under the Fish and Wildlife Coordination Act is not required. No coordination with the with the US Fish and Wildlife Service is required under the Endangered Species Act, as no Threatened or Endangered Species occur on the Project Area.

3.13.2 Botany

No coordination with the with the US Fish and Wildlife Service is required under the Endangered Species Act, as no Threatened or Endangered Species occur on the Project Area.

3.13.3 Hydrology and Soils

E.O. 11988 – Floodplain Management

Floodplains in the Catamount Project Area would be protected by implementation of the BMPs (JW Associates 2010d) and the design features listed in *2.3.2 Soil and Water Quality Protection*. There would be no direct, indirect or cumulative effects on floodplains from Alternative B (Proposed Action).

E.O. 11990 – Protection of Wetlands

Wetlands in the Catamount Project Area would be protected by implementation of the BMPs (JW Associates 2010d) and the design features listed in *2.3.2 Soil and Water Quality Protection*. There would be no direct, indirect or cumulative effects on wetlands from Alternative B (Proposed Action).

Clean Water Act of 1977

All alternatives for the Catamount Forest Health and Hazardous Fuels Reduction Project would not degrade water quality and would be in compliance and meet the requirements of the CWA.

Section 402

Discharge Permits –This permit applies to point sources. There would not be any point sources of pollutants as a result of this project and silvicultural activities are exempt from this permit. Any potential source of pollutants as a result of this project would be labeled as non-point and this project would meet and comply with the Forest Plan Standards, which incorporate BMPs that are designed to meet water quality standards through control of non-point source of pollutants.

Storm Water Associated with Construction Activities – Silvicultural activities, including road construction to access treatment areas, are exempt from this permit. As mentioned above, Forest Plan Standards would be implemented to prevent and minimize pollution.

Section 404

Silvicultural activities and roads associated with these activities are exempt from this permit as long as the 15 mandatory BMPs are implemented as listed in 33 CFR 323.4. Those BMPs are listed below:

1. Permanent roads (for farming or forestry activities), temporary access roads (for mining, forestry, or farm purposes) and skid trails (for logging) in waters of the U.S. shall be held to the minimum feasible number, width, and total length consistent with the purpose of specific farming, silvicultural or mining operations, and local topographic and climatic conditions;
2. All roads, temporary or permanent, shall be located sufficiently far from streams or other water bodies (except for portions of such roads which must cross water bodies) to minimize discharges of dredged or fill material into waters of the U.S.;
3. The road fill shall be bridged, culverted, or otherwise designed to prevent the restriction of expected flood flows;
4. The fill shall be properly stabilized and maintained during and following construction to prevent erosion;
5. Discharges of dredged or fill material into waters of the United States to construct a road fill shall be made in a manner that minimizes the encroachment of trucks, tractors, bulldozers, or other heavy equipment within waters of the United States (including adjacent wetlands) that lie outside the lateral boundaries of the fill itself;
6. In designing, constructing, and maintaining roads, vegetative disturbance in the waters of the U.S. shall be kept to a minimum;
7. The design, construction and maintenance of the road crossing shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body;
8. Borrow material shall be taken from upland sources whenever feasible;
9. The discharge shall not take, or jeopardize the continued existence of, a threatened or endangered species as defined under the Endangered Species Act, or adversely modify or destroy the critical habitat of such species;
10. Discharges into breeding and nesting areas for migratory waterfowl, spawning areas, and wetlands shall be avoided if practical alternatives exist;
11. The discharge shall not be located in the proximity of a public water supply intake;

12. The discharge shall not occur in areas of concentrated shellfish production;
13. The discharge shall not occur in a component of the National Wild and Scenic River System;
14. The discharge of material shall consist of suitable material free from toxic pollutants in toxic amounts; and
15. All temporary fills shall be removed in their entirety and the area restored to its original elevation.

3.14 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low income populations. The Order further stipulates that the agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination because of their race, color, or national origin.

The proposed vegetation treatments and other activities are designed to reduce wildfire hazard, restore forest conditions and protection watersheds. These activities would not disproportionately affect minority or low income communities. While local communities would be affected by the proposed actions in the short-run, these actions are intended to reduce the risk of large scale fires and potential damage to property and human health of the type experienced during and following the Hayman Fire.

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